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ABSTRACT

The keynote address, "Productivity as a Means of Economic Development," by Donald C. Burnham, and 20 other conference presentations on technical education are included in these proceedings. Titles are as follows: A Technical College Responds to a Need for Productivity; The Industrial Answer to Productivity Through Technical Education; An Overview of Co-op Education; Education's View of Productivity Through Co-op Education; A Student's View of Co-op Education; Erasing Architectural Barriers for the Disabled/Handicapped; Innovations in Technical Education: Preparing the Handicapped for Productive Careers; Employing the Handicapped/Disabled; Productivity--Photo Optical Training and Education; Productivity--Agribusiness; Productivity--Food Service; The Role and Function of the National Network for Curriculum Coordination in Vocational Technical Education; Managing Buildings for Efficient Energy Utilization; Credit Through Noncollegiate Organizations; Upgrading Employees for Future Productivity; Productivity in the Health Sciences; Productivity in Technology and Learning; Joint Apprenticeship--Associate Degree Program; and The Challenge of Change. The names and addresses of conference participants and their addresses are listed, along with conference exhibitors and their representatives, and a copy of the conference program is included. (LAS)

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ED138741

PROCEEDINGS

OF THE

THIRTEENTH ANNUAL

AMERICAN TECHNICAL EDUCATION

NATIONAL CLINIC

Sponsored by:

American Technical Education Association

United States Office of Education - Division of Vocational and Technical Education

American Vocation Association - Technical Division

Hosted by:

Monroe Community College

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
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Holiday Inn
Rochester, New York

March 24-26,1976

CE 010 830

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PROGRAM
THIRTEENTH ANNUAL
AMERICAN TECHNICAL EDUCATION
NATIONAL CLINIC

March 24-26, 1976

Theme
"Technical Education - Key to Productivity in 1976"

SPECIAL MEETINGS

Tuesday, March 23, 1976

2:00-4:00 P.M.	Regional Representatives Meeting - Downtown Room
4:00-6:00 P.M.	Board of Trustees Meeting - Exchange Room

Wednesday, March 24, 1976

5:00-7:00 P.M.	Site Selection Planning Committee Dutch Treat Dinner Meeting - Exchange Room

Thursday, March 25, 1976

7:30-9:00 A.M.	ATEA Past Presidents' Breakfast - Fairfax Room
10:30-11:00 A.M.	ATEA Atlantic Region Meeting - Genesee Room
11:00 A.M.-12:00 NOON	ATEA Business Meeting - Boulevard, Crossroads and Downtown Rooms

WEDNESDAY, MARCH 24, 1976

9:00 A.M.-10:15 A.M. **Boulevard, Crossroads, Downtown**

OPENING SESSION

PRESIDER:
Harry S. Bigelow
President, ATEA
Argonne National Laboratory
Argonne, Illinois

RECORDER:
Dr. John W. Glenn
Director of Vocational Teacher Education
State University at Utica/Rome
Utica, New York

WELCOMING REMARKS:

Dr. Moses S. Koch
President
Monroe Community College
Rochester, New York

Joseph N. Ferrari
President
Monroe County Legislature
Rochester, New York

Thomas P. Ryan, Jr.
Mayor
Rochester, New York

MEDLEY:

Monroe Community College
Swing Choir and Jazz Ensemble

KEYNOTE ADDRESS: "PRODUCTIVITY AS A MEANS OF ECONOMIC DEVELOPMENT"

INTRODUCTION:

Dr. Mary Ellis
Ellis Associates, Inc.
Washington, D.C.

SPEAKER:

Donald C. Burnham
Vice Chairman, President Ford's
National Commission on Productivity
and Work Quality
Pittsburgh, Pennsylvania

10:15 A.M.-10:45 A.M. **Exhibit Area**

Coffee Break

10:45 A.M.-12:00 NOON **Boulevard, Crossroads, Downtown**

FIRST GENERAL SESSION "PRODUCTIVITY THROUGH TECHNICAL EDUCATION"

PRESIDER:

Dr. Walter Brooking
Division of Vocational-Technical Education
United States Office of Education
Washington, D.C.

RECORDER:
Ralph Caldwell
Superintendent of Technical Education
State Department of Education
Jackson, Mississippi

WELCOME FROM WASHINGTON:
Dr. Richard F. Carlson
Director, Division of Vocational and Technical Education
United States Office of Education
Washington, D.C.

INTRODUCTION:
Dr. Walter Brooking, Presider

Subject One
"A Technical College Responds To A Need For Productivity"

SPEAKER:
Robert "Buck" L. Grigsby
President
Midlands Technical College
Columbia, South Carolina

Subject Two
"The Industrial Answer To Productivity Through Technical Education"

SPEAKER:
Howard Jaquith
Vice President
Research & Development
Taylor Instrument Process Control Division
Sybron Corporation
Rochester, New York

12:00 NOON-1:30 P.M.

Lunch On Your Own

1:30 P.M.-3:00 P.M. **Boulevard, Crossroads, Downtown**

SECOND GENERAL SESSION "INCREASING PRODUCTIVITY THROUGH CO-OP EDUCATION"

PRESIDER:
Frank E. Sharkey, Jr.
State University of New York at Buffalo
Buffalo, New York

RECORDER:
Rudy Williams
Director, Occupational Education - South Campus
Miami-Dade Community College
Miami, Florida

Subject Three
"An Overview Of Co-Op Education"

SPEAKER:
Roy L. Wooldridge
Vice President for Co-Operative Education
Northeastern University
Boston, Massachusetts

Subject Four
"Education View Of Productivity Through Co-Op Education"

SPEAKER:
Paul Gould
Coordinator, Industrial Co-Op Education
Macomb Community College
Warren, Michigan

Subject Five
"A Student's View Of Co-Op Education"

SPEAKER:
Edward J. McGee
Field Engineer
Sear-Brown Associates
Rochester, New York

3:30 P.M.-5:00 P.M. **Boulevard, Crossroads, Downtown**

THIRD GENERAL SESSION - "PRODUCTIVITY WITH THE HANDICAPPED/DISABLED"

PRESIDER:
Leon Hardison
State Technical Institute at Memphis
Memphis, Tennessee

RECORDER:
Merline Maiers
Chairman, Trade and Industrial Division
Madison Area Technical College
Madison, Wisconsin

Subject Six
"Erasing Architectural Barriers For The Disabled/Handicapped"

SPEAKER:
Dr. Betty Brown
Division of Physical Education
Miami-Dade Community College
Miami, Florida

Subject Seven

"Innovations In Technical Education: Preparing The Handicapped For Productive Careers -- An Emerging Responsibility"

SPEAKER:
Dr. Jack Clarcq
Associate Dean
National Technical Institute For The Deaf
Rochester Institute of Technology
Rochester, New York

Subject Eight

'Employing The Handicapped/Disabled"

SPEAKER:
Jack Smith
Executive Director
White House Conference on Handicapped Individuals - HEW
Washington, D.C.

5:00 P.M.-7 P.M. **Exchange Room**

SITE SELECTION PLANNING COMMITTEE DUTCH TREAT DINNER MEETING

7:00 P.M.-9:00 P.M.

EDUCATIONAL TOURS
1) Strasenburgh Planetarium
2) Monroe Community College

THURSDAY, MARCH 25, 1976

7:30 A.M.-9:00 A.M. **Exchange Room**

ATEA PAST PRESIDENTS BREAKFAST

9:00 A.M.-10:30 A.M.

MINI SESSIONS - GROUP ONE

Subject Nine **Boulevard Room**

"Productivity-Photo Optical Training and Education"

PRESIDER:
Jack Salley
Dean of Institution
Midlands Technical College
Airport Campus
Columbia, South Carolina

RECORDER:
Dr. Roger A. Mussell
Associate Professor
William Rainey Harper College
Palatine, Illinois

SPEAKERS:
Martin Dvorin
Assistant Dean, Division of Engineering Technologies
Monroe Community College
Rochester, New York

John A. Pearson
Group Leader, Lens Making
Kodak Apparatus Division
Eastman Kodak Company
Rochester, New York

James T. Freeland, Jr.
General Supervisor, Lens Assembly
Kodak Apparatus Division
Eastman Kodak Company
Rochester, New York

Subject Ten **Crossroads Room**

"Productivity - Agribusiness"

PRESIDER:
James S. Smith
Howard Community College
Columbia, Maryland

RECORDER:
Dr. James Hoerner
Virginia Polytech Institute
State University at Virginia
Blacksburg, Virginia

SPEAKER:
Dr. Thomas Leamer
Chairman, Plant Science Department
State University of New York
Ag & Tech at Cobleskill
Cobleskill, New York

Subject Eleven **Downtown Room**

"Productivity - Food Service"

PRESIDER:
Paul Chakonas
State Education Department
Albany, New York

RECORDER:
Arnold H. Potthast
Chief, Trade and Industry
Wisconsin Board of Vocational Technical Adult Education
Madison, Wisconsin

SPEAKERS:
Fred Samson
New York State Restaurant Association
New York, New York

Carl Arena
Burgundy Catering
Pittsford, New York

David Geller
Instruction Coordinator
Operating Procedure Department
The Culinary Institute of America
Hyde Park, New York

Subject Twelve **Fairfax Room**

"The Role And Function Of The National Network For Curriculum Coordination In Vocational Technical Education"

PRESIDER:
Dr. Larry Hoffman
Chairman, Graduate Engineering Technology
Rochester Institute of Technology
Rochester, New York

RECORDER:
Bernard Logan
Chairman, Electrical Technology
College of Continuing Education
Rochester Institute of Technology
Rochester, New York

SPEAKER:
Dr. Joseph Kelly
Director, Northeast Curriculum
Coordination Center-Bureau of Occupational Research
Division of Vocational Education
Trenton, New Jersey

10:30 A.M.-11:00 A.M. **Mezzanine and Algonquin Room**

COFFEE BREAK

ATEA ATLANTIC REGION MEETING FAIRFAX ROOM

11:00 A.M.-12:00 NOON **Boulevard, Crossroads, and Downtown Room**

ATEA BUSINESS MEETING

12:00 NOON-1:30 P.M.

LUNCH ON YOUR OWN

1:30 P.M.-2:30 P.M. **Fairfax Room**

Subject Thirteen
"Managing Buildings For Efficient Energy Utilization"

PRESIDER:
Richard B. Halvorson
Director, Washington Community College, District 17
Spokane, Washington

RECORDER:
Dr. Phillip Ruehl
Assistant Dean, Industrial Division
University of Wisconsin-Stout
Menomonie, Wisconsin

SPEAKER:
James C. Martini
Instructor, Heating, Cooling and Steam Power
Henry Ford Community College
Dearborn, Michigan

1:30 P.M.-4:30 P.M.

TOURS
3) Eastman Kodak Marketing Center
4) Rochester Institute of Technology National Technical Institute for the Deaf

FRIDAY, MARCH 26, 1976

8:30 A.M.-10:00 A.M. **Boulevard, Crossroads, Downtown**

FOURTH GENERAL SESSION - "UPGRADING EMPLOYEES FOR PRESENT AND FUTURE PRODUCTIVITY"

PRESIDER:
(To be announced)

RECORDER:
Jack L. Tompkins
Executive Vice President
Texas State Technical Institute
Waco, Texas

Subject Fourteen
"Credit Through Non-Collegiate Organizations"

SPEAKER:
Dr. John McGarraghy
Director, Office of Non-Collegiate Sponsored Instruction
New York State Education Department
Albany, New York

Subject Fifteen
"The Continuing Education Program At Kodak Park"

SPEAKER:
Dr. Richard Edgerton
Director of Training
Kodak Park
Rochester, New York

Subject Sixteen
"Managing Education As A Business"

SPEAKER:
Marion G. Wood
Manager For National Service Training
Xerox Corporation
Rochester, New York

10:00 A.M.-10:30 A.M. **Mezzanine and Algonquin Room**

COFFEE BREAK

10:30 A.M.-12:00 NOON

MINI SESSIONS - GROUP TWO

Subject Seventeen **Exchange Room**
"Productivity In The Health Sciences"

PRESIDER:
John Owens
Director, Technical Occupational Education
Dallas County Community College District
Dallas, Texas

RECORDER:
William Welch
Division Chairman, Technical and Industrial Education
Western Wisconsin Technical institute
LaCrosse, Wisconsin

SPEAKERS:
Mary Pat Pennell
Assistant Dean, Health Services
Monroe Community College
Rochester, New York

Louis Albert
Acting Associate Dean of the College
Essex Community College
Baltimore, Maryland

A. Donald Insley
Chairman, Department of Nursing
State University of New York at Alfred
Alfred, New York

Subject Eighteen **Fairfax Room**

"Productivity In Technology And Learning"

PRESIDER:
Dr. Lee W. Ralston
Consultant
Education Services Center - UCLA
Santa Monica, California

RECORDER:
John Nealon
Senior Advisor
Bureau of Occupational and Adult Education
Washington, D.C.

SPEAKER:
Dr. Delbert A. Hillen
Education Specialist
U.S. Navy Recruiting Area One
Scotia, New York

"Joint Apprenticeship - Associate Degree Programs"

PRESIDER:
Lawrence C. Gray
Chief, Bureau of Two Year College Programs
New York State Education Department
Albany, New York

RECORDER:
Daniel Wise
Dean of Technical and Career Education
Prince George's Community College
Largo, Maryland

SPEAKERS:
Frederick A. Byrne
United States Department of Labor
Employment and Training Administration
Bureau of Apprenticeship and Training
Rochester, New York

Michael Collins
Director, Operating Engineers
Dual Enrollment Program
Washington, D.C.

Donaid Grabowski
Director, New York State Department of Manpower Development
Albany, New York

12:00 NOON **Boulevard, Crossroads and Downtown Rooms**

ANNUAL LUNCHEON

PRESIDER:
Harry Bigelow
President, ATEA
Argonne National Laboratory
Argonne, Illinois

RECORDER:
Barbara J. Walter
Chairperson, Home Economics Division
Western Wisconsin Technical Institute
LaCrosse, Wisconsin

SPEAKER:
J. Frederick Kenney
Manager, Marketing Development
Xerox Corporation
Rochester, New York

INTRODUCED BY:
Harry Bigelow, Presider

3:00 P.M.

ADJOURN

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Wahpeton, North Dakota

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Largo, MD

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United States Office of Education
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Monroe Community College

Dr. Ed Maruggi
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and Mathematics Learning Center
National Technical Institute for the Deaf

Ouida Norris
Chairperson, Biomedical
Engineering Technology
Monroe Community College

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Institute for the Deaf

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Monroe Community College

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Rochester Institute of Technology

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Rochester Institute of Technology

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Monroe Community College

Colette Fegan
Monroe Community College

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Dan Lyons
Controller
Monroe Community College

KEYNOTE ADDRESS

"PRODUCTIVITY AS A MEANS OF ECONOMIC DEVELOPMENT"

Donald C. Burnham, Vice Chairman,
President Ford's National Commission
on Productivity and Work Quality

I am very happy to have the opportunity to speak about productivity to this 13th National Clinic on Technical Education. The theme of your conference, "Technical Education — The Key to Productivity in 76," could just as well have been "The Key to Productivity in 76, 86 and 96." A primary basis for long range improvement in productivity is the education of the work force.

When I visited South America several years ago, in Peru up near Cusco, I watched an Indian planting a field of corn. The field was no bigger than this room and he was digging it up with a hand hoe. This man was required to spend nearly all of his working time to grow enough corn to eke out a bare existence.

Later that same year I visited my daughter in Sac City, Iowa. She took me a short distance out of town to show me a field of corn one mile by one mile in size with not a single road or path through it, just solid corn, all exactly the same height. At the edge of town I saw the large air conditioned tractors that pulled the gang plows to plow this field. I also saw giant mechanical corn pickers that harvested the crop. Whereas the Indian in Peru spent nearly all of his time growing just enough food to keep him alive, in this country less than 4% of our work force grows all

of the food that we need. In fact, we grow nearly twice as much grain as we need and are able to ship much of it to other countries. The percentage of our work force engaged in farming has been reduced from nearly 50% a hundred years ago to less than 4% today. Productivity improvement made this possible. Better farm machinery, better kinds of fertilizer, better seeds, better irrigation methods have brought about this tremendous improvement.

This improvement in productivity did not happen by accident. It really started back in the Civil War times when the land grant colleges were established. Their primary purpose was to teach agriculture. Agricultural experiment stations were organized some years later to be used as proving grounds to prove out the new methods. Later on, county agents were established to disseminate the new productive methods to the millions of independent farmers. This hundred years of improvement in agricultural productivity is still continuing, and it is still based on improved education in the field of agriculture. This great improvement has allowed us to export grain to Russia, China and other countries and maintain a positive balance of trade in spite of all the oil that we have had to import in the past year. A recent issue of Newsweek stated that the United States has 3.4% of its work force in agriculture. Russia has 26%, and I have observed that China has about 80% working on farms.

Not only do we eat well in this country, but the improvement in productivity in agriculture has enabled the people to move into the cities

to form the basis of the work force that has let us become a great industrial nation.

Just what is productivity? I look at it from the standpoint of people. It is the amount of product or service produced by a person in a specific period of time. In my view, materials, machinery and energy are only things that help people to be more productive.

We want to improve productivity each year because that's the only way we can really improve our standard of living. We can't have more unless we produce more. We cannot expect to get that improvement from working harder. We must get it from better designs of product, better machines of production, better systems and procedures, and better employe effectiveness. As individuals and as a nation our economic welfare depends upon how much we can improve our productivity.

STATUS OF PRODUCTIVITY IN THE UNITED STATES

Just what is the overall United States productivity picture? During the past decade when our productivity improved about 3% a year, the productivity in Germany and Japan and some other industrialized countries was moving up at rates of 6% to 14% per year. These countries have been gaining on us in the last decade, but as you know our overall productivity is still higher than theirs.

But how have we been doing in the last year or two? In the last quarter of 1975 — the most recent data available — our productivity moved up at a rate of only 1% a year. In the last year 1975, we had a

a productivity gain of only 1.3%, and just prior to this in 1974, we actually had a loss in productivity in the United States of 2-1/2%. So our recent productivity progress has not been good compared to our normal long range improvement over several decades of about 2.8% a year. We don't need to compare ourselves to others but just to look at our own current record to know that we must exert a major effort to improve our productivity in the future.

Other countries are setting high goals. Let me quote from Time magazine of March 15, 1976, on Russia's next five year plan:

> "Running from 1976 through 1980, the plan aims to boost output by 38% to 42% in heavy industry, by 14% to 17% in agriculture. Consumer goods are to grow at 30% to 32%. Kosygin's prescription for his country's economy was increased productivity based on 'scientific and technological progress and utmost thrift.'"

THE NATIONAL CENTER FOR PRODUCTIVITY AND QUALITY OF WORKING LIFE

Late last year, Congress passed a law establishing a National Center for Productivity and Quality of Working Life. The Vice President, Mr. Rockefeller, was named Chairman of the Board of this Center and members of management, labor and the government will be on its Board of Directors. This new productivity Center replaces the former National Commission on Productivity and Work Quality which had

prepared a policy statement on productivity, which was issued late last year and which forms a basis for planning the work of the new National Center for Productivity and Quality of Working Life. This policy statement divides the productivity problem into three areas of concern — human resources, technology and capital investment, and government regulation. You will be particularly interested in what the policy says concerning education and training, and I quote:

> "Overall, the Commission believes that the traditional strength of our educational institutions is a main factor in the capacity of the United States to improve productivity. The quality of the scientists doing research, the engineers planning new products and methods, and the managers, administrators and workers operating our productive enterprises and public service organizations all depend on our educational system.
>
> "To keep pace with the requirements of the increasingly complex socio-economic environment, the Commission believes that U.S. education can and should become increasingly responsive to the needs of society, including especially the need for a well-prepared work force. Without compromising the excellence of our liberal arts programs, the future demands somewhat more emphasis on shaping our educational directions to better prepare graduates at all levels for the realities of a productive life."

I continue to quote from the policy statement:

"At all levels of education, there is a need for communication and interaction between schools and local business and labor organizations. Through this process, educators can keep up with skill requirements and labor market demands, and design course content, counseling, and job placement programs accordingly. Similarly, through closer contact with educational institutions, business and labor can better adapt their organizations to changing social mores.

"The Commission feels that training programs outside the formal educational system can make an important contribution to productivity. These would include programs to provide marketable skills to the unemployed and the underemployed who have passed the normal age for attending high school. In addition, we need better programs to upgrade the skill levels and thus the economic opportunities of workers already in the labor force — with particular emphasis on those with high school degrees or less.

"Finally," the policy statement concludes, "there is a broad requirement for improving, through educational programs both within and outside the formal educational system, the level of public understanding about our economic system. Particular emphasis should be given to altering the misconceptions

"or nonconceptions which many people have about productivity itself, including the role which productivity gains play in improving the quality of our lives and the role we all play in achieving productivity gains."

This new National Center will be concerned with getting labor and management to have everyone in an organization participate in productivity improvement, it will be concerned with job security, with the quality of working life, and with motivation to make improvements. All of these concern human resources.

The second major area of concern — technology and capital investment — must also be studied and changed if we are to obtain the optimum amount of productivity improvement. The United States has had a technological lead over other countries in the world, but I am disturbed by headlines like that appearing in the New York Times on Sunday, March 14. 1976, stating "U.S. Science Lead Is Found Eroding." This study by the National Science Foundation indicates that we have been cutting back on the proportion of the United States gross national product spent on research and development, and that this is eroding our technological leadership over other countries. The National Center will be studying things that could be done to help stop this erosion of our technological leadership.

Capital investment in new machinery, new processes and new factories is needed if we are to continually improve our productivity.

The new productivity Center will be studying ways to stimulate greater investment in these productivity-improving assets. Other countries spend a higher portion of their gross national product on capital investment, and we may need to change some of our depreciation and tax rules in order to encourage more capital investment to get productivity improvements.

The third major concern is government regulation. A high percentage of people believe that many government regulations are a hindrance to productivity improvement. The productivity Center will make an effort to get the affected industries working with the regulating bodies to try to eliminate or modify government regulations so that productivity can be improved.

OPPORTUNITIES FOR PRODUCTIVITY IMPROVEMENT IN INDUSTRY

No matter what one is doing, the opportunity for productivity improvement exists. Making an improvement this year doesn't mean that you can't make a further improvement next year. It has been my observation that a department that improves its productivity 5% this year will probably improve it 5% again next year. Whereas the department that improves its productivity only 1% this year will probably improve it only 1% next year. Opportunities are always there. The amount of improvement depends upon the organization and effort put into finding these improvement opportunities and putting them into effect. I believe that most industrial organizations should look for a 5% improvement

in productivity each year from new technological changes that will enable the worker to do his job more effectively. It can be done by changing the product design to make possible fewer parts or less material, by installing new machinery that makes the manufacturing operation more efficient and by new plant layouts and methods. A continuing investment of capital and effort in new products and new manufacturing methods should get a 5% a year improvement in productivity in the shop.

The same thing applies to the white collar area of industry. Now in many industries, in fact in my own company — Westinghouse, there are more white collar workers than blue collar workers. A 5% a year improvement can be obtained in this white collar area by following some of the same techniques that have been used for decades in the factory — investment in capital equipment such as computers; use of short term scheduling; elimination of unnecessary reports; an analysis of what each person does and an elimination of the work that is not vital to accomplishing the mission of the organization. Although the white collar sector has not been studied for productivity improvement as much as the shops, the opportunity is there and the improvement can be made.

In addition to the 5% a year cumulative improvement from technological changes, it is possible to get a productivity increase of perhaps 10% in many industrial plants by getting everyone to be really

interested in doing a good productive job. Participative type of management, such as that advocated by the writers Likert and Vough, where everyone is on the team, where management and labor work together to try to find ways to do jobs more productively, can raise the general level of productivity without anyone really working any harder. This is accomplished by cutting down on absenteeism, starting to work on time, improving the quality of the work, reducing the amount of inspection required, reducing the amount of maintenance needed, making sure that delays don't occur because materials are not available to work on, etc. All of these plus minor methods changes made by the worker can really make a significant difference and raise the whole level of productivity. This is in addition to the 5% a year cumulative improvement that should be obtained from capital investment and technological change.

OPPORTUNITIES FOR PRODUCTIVITY IMPROVEMENT IN THE SERVICES

Just as productivity improvement in agriculture reduced the percentage of the working population in agriculture from 50% a hundred years ago to 3.4% today, the work on productivity improvement in industry is reducing the percentage of the work force required to make the things we need. Before the end of this century, we will have reduced the number of people required in industry to 25% of our work force. This means that nearly 70% of our work force will be working in the services. By the services I mean health care, government, education, retailing,

maintenance, recreation, etc. This is where the people are going to be working and this is where we urgently need to improve productivity. The job of productivity improvement has not been tackled in the services the way it has been in agriculture and industry, but I think some of the same techniques can be used. I'm convinced we can get the same kind of continuous improvement in the services area, and I am glad to see that some of the things you are going to talk about in this meeting concern the services.

When you look at the people working in a hospital, they are doing the same kinds of things that the people are doing in the factories and in the offices of industry. They are keeping records, moving things around, running machines, performing work at benches, etc. The same techniques can certainly be tried in the services that have worked well in industry. Although it is more difficult to measure, performance can be measured. Performance can at least be measured against the previous year if absolute standards cannot be used. Method studies can be applied to the services area and certainly we have hardly begun to invest capital in equipment to help do the job in the services.

Government, health care, education, retailing, maintenance, etc., offer a great opportunity for the graduates of your institutions in the next twenty-five years. And I hope that you will encourage them to apply their knowledge to improving productivity in the services.

PRODUCTIVITY OPPORTUNITIES FOR THE TECHNICAL GRADUATE

About a month ago, I visited our plant in Baltimore that makes radar equipment. Not only is the product highly technical but the manufacturing methods in this plant are very advanced. They have a number of numerically controlled machine tools and computer controlled testing devices. It was here that I saw the nearest thing to an automated factory in my experience. A radar antenna with complex curves on it is designed by developing the numerical formula for the curves. An elaborate computer program has been devised so that it is only necessary to put this formula into the computer and it turns out tapes that can be put on the numerically controlled machines to machine these parts. It is not even necessary to make a drawing of these antenna parts. The same computer, when the formula is fed into it, types out the purchase orders for the materials and makes out the manufacturing information to route the product through the shop.

Such highly complex production methods were, of course, designed by graduate engineers. This is the kind of work that most of our new engineering graduates want to do. They are not so interested in doing normal design of jigs and fixtures, the working out of hoppers to hold parts, the making of plant layouts to show where people should be located to reduce travel, the making of motion studies or method studies. These no longer seem to have the glamour that the new highly sophisticated manufacturing methods now have.

But as I went through this very modern, progressive factory, I noted each operator and tried to estimate what percentage of the employes in the plant were working on numerically controlled machines and highly sophisticated computerized operations. I observed that only about 5% of the people were really working on this type of manufacturing. The other 95% were sitting at benches with little hoppers assembling parts that were staked together in simple jigs. They were running wires from one position to another to build up wiring harnesses. They were grinding tools. They were filling out forms showing what work they had completed. In fact, they were doing the same kinds of things that most of the people in factories have been doing for many decades.

Now, if we want to improve the overall productivity of the whole operation by 5% each year, we can't do it by just improving the highly sophisticated operations. We've got to improve the rest of the work that is being done by more normal methods. This is where the majority of the improvement will come, and I think this is where the graduates of your technical schools can find a real challenge, a challenge that has been dropped by many of the graduate engineers. Although your graduates will certainly be in on many of the highly sophisticated improvements, I hope they recognize the real challenge to improve every job, no matter how normal it may be.

ATTITUDE NEEDED FOR PRODUCTIVITY IMPROVEMENT

Nothing is improved until something is changed, so I hope that you are instilling in your students the attitude that they should not do things in the same old way by the same old techniques. They should always be looking for improvement in anything that they do.

We hear a lot about quality of working life these days. I sincerely believe that the important quality of working life that each employe really wants is to have a challenging job that uses his talents and where the work he accomplishes is considered to be important. I can think of no way to make his work more interesting than to have him always seek to improve his own productivity and the productivity of others who use his work. If we all focus our attention on improvement, our national productivity will start to move up again, and so will our standard of living.

"A TECHNICAL COLLEGE RESPONDS TO A NEED FOR PRODUCTIVITY"

Robert "Buck" Grigsby, President
Midlands Technical College

BYE, BYE MAGNOLIAS, MINT JULIPS AND BACCALAUREATE DEGREES

Let me frame the setting for the selection of such a title. South Carolina found itself 96 years after the conclusion of the "war of northern aggression" still in limbo and just beginning to recover from the reconstruction days. Now this is not a racist speech, this is not a sexual speech, but you need to know the background. You need to know that South Carolina had been faced with the dilemma of always having to say when there was only 48 states; "thank God for Mississippi" because they were usually 48 and we were 47. In South Carolina, we had the 10 percent "have's" and 90 percent "have not's." In 1961, there was only a small middle class. The "have's" went to their private clubs and traveled in their exclusive social circles enjoying the luxuries and now "more importantly" the necessities of the present day. The "have not's" were excluded from these private memberships not because of character nor financial status but by accident because they were not born in the "have" group nor did they marry into the group.

Let visions in the back of your mind drift to 1960 when this brilliant Governor, now the U. S. Senator Ernest F. Hollings, assumed office. Newly elected on a platform of selling South Carolina to the world and more importantly to the industrialists of the world, Hollings set out to develop a team that could industrialize South Carolina. He hired a distinguished and successful industrial developer to be the Director of the State Development Board. The moment the Director of the Development Board came on board, he stated, "Governor, you do not have a trained work force; yet you have capable people. We somehow

must come up with a training program so that these people may go to work." The Director of the Development Board's concerns were not for the 10 percent "have's." He said, "We are not really interested in them, they go to college, they have all of the luxuries, their per capita income is as high as any in the United States. Their education levels are more than adequate. We must concern ourselves about the 90 percent who are the 'have not's.' So let us develop some means of training these South Carolinians."

Now let me tell you quite frankly that South Carolina was faced with the dilemma of which came first, the hen or the egg (new industry or trained labor). Well, we did not decide which came first, the hen or the egg, because we could not afford the luxury of that decision. What we did decide was that we would prove that the hen and the egg arrived on the scene simultaneously. Now, I want you to bear in mind what I have said thus far: The 10 percent "have"; the 90 percent "have not"; a Governor who ran on a platform of selling South Carolina to the world and the industrialists so they would relocate in South Carolina; a Director of the Development Board who said that you must have trained people or you cannot bring industry in. How did we solve the dilemma of whether the hen or the egg came first? Let me give you an example of what took place all over the state through the TEC centers; an example telling you how we stopped citizen outmigration and began industrialization of our state.

Mr. Rasputin of the IRST Corporation hands me a card as he walks into the office. I was notified at 9:00 a.m. on Wednesday morning, January 14, that Mr. Rasputin and a member of the Development Board would be in my office at 11:00 a.m. Please clear my calendar. This is the type of arrangement that we had and still have with the Development Board and the presidents and directors of our technical colleges and technical education centers. My calendar was immediately cleared and about 11:15 a.m. or 11:30 a.m., they are usually late, Mr. Rasputin and a

member of the Development Board walked into my office ushered in by the secretary, Mrs. Rebecca Price. Mrs. Price says, "Mr. Grigsby, this is Mr. Rasputin of the IRST Corporation and Mr. Skidmore of the Development Board." I state, "Mr. Rasputin welcome, sir, to Columbia, South Carolina, the capital of the great and sovereign State of South Carolina. We are delighted to have you looking at South Carolina for a possible relocation of your plant. Mr. Rasputin, I understand this is not your real name and your corporation, IRST, is not in Dunn and Bradstreet. I am not offended by your not confiding in me as I know it is very important for you to maintain absolute confidentiality during your diligent search for a place to relocate. I assure you that I shall keep everything that is said here in confidence, even with your assumed name and your corporation. Let me state that South Carolina has long faced the dilemma of what came first, the hen or the egg. Do we go out and get industry to relocate in South Carolina and then train the workers or do we train the work force and then go out and try to get industry to come in? Well, the position we have taken, Mr. Rasputin, is this. We feel it is unfair to an industry to locate in South Carolina without a trained work force. But secondly and just as importantly we feel that it is inappropriate to train people without known job opportunities. Therefore, TEC in South Carolina is an economic tool which is used to help raise the economic level of our citizens and to aid the industry that is relocating in having a trained labor force to a 70 percent efficiency level. Now understand that I am a former member of the corporate community having served as a front-line supervisor, a middle manager and ultimately as a manager of manufacturing of the General Electric Company. We realize that you are interested in one thing and in one thing only--in the final analysis and that is the bottom line of your financial statement; that that figure be black; and that it be a minimum of 7 percent net after taxes or 20 percent return on investments. This is the

program we can offer you and your company. We will provide for your industry at no cost a group of prospective employees that has been trained in a special school designed to your specifications in a pilot line operation. They know what your company will be manufacturing; your people will be asked to present an overview of your company, to include its mission, its purpose, and its fringe benefits and your reasons for coming to South Carolina. Further, we would like for you to emphasize the free enterprise system and what it will mean to your employees when the company makes a profit. The economic system that has made us the most productive and the most affluent nation in the history of the world. We have 14 industrial engineers, and at the point of your plant announcement, we will assign a team of 2 of these 14 who will visit the plant you are planning to relocate. This can be done incognito if the visit will cause difficulty with your present employees. These people will come in as consultants to study this production line or this pilot line operation and will sit down with your people to develop the specific job elements that require training for your prospective employees. A lead-time schedule or PERT chart is developed starting with the date you plan to open your doors for operation and designing the schedule from that date. For the shorter training that is required, for assemblers, etc., these people would be phased in so that one week prior to the date your plant opens all of the people you asked us to train, in whatever number you asked, will be trained to a proficiency level of approximately 70 percent. Now up to this point you have made no commitment, but in that last week you will interview these people and ultimately you should employ 90 percent of them. But remember you have made no commitment up to this point. They are trainees of the S. C. TEC System; they fully understand this and sign an affidavit to this effect. They come on their own time which is indicative of the work attitude of the people of South Carolina. They are not paid for their training; they are not

guaranteed employment; they only receive a certificate of completion. During this entire training cycle your company personnel may visit the formal training sessions. If you see someone that you do not like, all you have to do is tell the instructor; that person will be phased out diplomatically and tactfully and your company is not involved. Now while these trainees are in school, a Select Committee of Outstanding Community Leaders screen the trainees for character, work habits and other attributes required to ensure that these persons will make your company a good employee. Let me emphasize that this is all done at no cost to your industry and your only commitment comes at the point of employment in the last two weeks prior to the opening of your plant. You may choose any site in South Carolina; we can train in a store front or a warehouse, in a TEC center or technical college, in a career education center or even in your plant if you have rented or leased space. We set up the pilot production line, we bring the people in on their own time, we recruit based on your qualifications, we select based on your qualifications, hopefully in conjunction with your personnel supervisor, and we train them for you. We have more than $50 million in equipment throughout the TEC System that can be relocated in the community you have selected. Remember, we start a school; stop a school; and produce a training manual according to your stated needs. You have the right to visit the classes and screen the trainees who are in the class. This equipment can be moved, as I indicated, to any spot in South Carolina, in the case of a very specialized piece of equipment; we ask you to loan it to TEC; we will pick it up at your dock, transport it to the training site, use it, maintain it, except for normal wear and deliver it to whatever point you designate. We may ask you to furnish instructors but these instructors will be consultants paid with state funds; they maintain their seniority with your company because you bill us for their services. In some instances we have recommended the total plant personnel

from the plant manager through the janitors to the personnel manager for selection. You may want to bring in your plant manager or your middle management, this is your choice; but we are ready to provide any services you need to start up your plant. Now the beautiful part about this is once your plant is opened and operating we do not forget about you. We have an industrial service representative who is constantly visiting in the geographical area served by a technical education center or a technical college to determine your training needs. At the point you decide to expand, we will provide the same services that were provided prior to your plant opening. You recall I mentioned the hen and the egg. Well this is the egg. This provides the opportunity for you to start up your plant with people trained to a 70 percent proficiency level. Now here is the hen. Mr. Rasputin, we have 16 technical education centers and colleges in South Carolina. These 16 institutions are within an easy commuting distance for 95 percent of the citizens of the State of South Carolina. The master plan has been completed; there are no plans to build additional occupational institutions. All training is postsecondary for age 18 or high school graduates, whichever occurs sooner. We offer programs that range from carpentry through the most sophisticated engineering technology with all of the variations and options of vocational, craft and technician training. We have more than 155 curriculum programs and options. Students attend classes depending on their schedule between 7:00 a.m. and 10:20 p.m. Monday through Friday and Saturday morning from 8:00 a.m. to 1:00 p.m. In addition, we currently have five weekend colleges starting with Friday night and ending Sunday afternoon. We are attempting to maximize the utilization of every inch of floor space as nearly as we can 24 hours a day. The educational environment in our institutions is geared toward the business environment. We do not have cafeterias, we do not have dormitories, we do not have athletic teams, we essentially are 'think and information'

factories training people to go to work for known job opportunities. This will provide for your company a continuing supply of tradespersons, craftpersons and technicians over the years. So you see that we have special schools or crash programs that come in, do the job, fold up shop and leave. In addition, every program that we offer has a lay advisory committee. We cannot offer a full-time program regardless of its length unless there are known job opportunities in South Carolina which are determined by regular surveys. We are not interested in training persons for any place other than South Carolina. We are only interested in training South Carolinians for known job opportunities. This is our mission. In addition, we offer upgrading and updating courses on a short-term basis for your employees. These may be held in a plant if there is a sufficient number of people (usually 8 or more) or in the TEC centers and colleges or career education centers. These courses are offered based on the need to upgrade your employees in their particular field of work or give a person in a lower skill level the opportunity to upgrade himself so that promotions may be afforded him. We have supervisory training designed specifically for the front line supervisor and the prospective front line supervisor realizing that he is the hub of the wheel, here is where the rubber hits the road. He interprets to his employees in a positive manner management's decision and in turn transmits to management the worker attitudes, morale and acceptance thereby making for a more effective and efficient organization. This will provide you with the manpower to operate your plant on a profitable basis. Remember, when you decide to expand, the 'start up' training may start again at your request. As I indicated, there are 16 technical education centers and technical colleges in South Carolina which cover 95 percent of our state with approximately 100,000 people currently enrolled. You have the opportunity of availing yourself of these people when you need additional trained manpower.

As you walk through the college, I want you to take a special note of the type of equipment you will find in our shops and labs, for illustration, numerical tape control equipment is used in many of our areas. In Engineering Technology we use the equipment you are using in industry. I mentioned the lay advisory committees for our curriculum programs. It is their specific responsibility to see that we remain current in our educational programs so that the persons who finish are ready to go to work. The equipment is current and updated every three years so that we may remain current with industry, business and government. Further, they review the curriculum, recommend the qualifications of our instructors, meet at least twice a year, review equipment, advise if outdated and recommend what new equipment should be acquired. They are continually monitoring our instructional programs to ensure that the needs of industry, business, government and other employers are being met. We recognize that occupational education is the most expensive type of education and I assure you South Carolina recognizes this and places it in its proper perspective. I would ask you to consider very carefully the advantages of locating in South Carolina."

Ladies and gentlemen of the National Clinic of the American Technical Education Association, I have attempted to give you in simple terms our efforts to respond to the needs for productivity. I think you can see that South Carolina, through its efforts, has answered the question, "Which came first the hen or the egg?" Our answer is that they came together, using education and training as an economic tool with the "start up" training and the continuing training provided in the 16 TEC institutions. Certainly, we are not in competition with the four-year state colleges, private colleges and universities. There is a place for these institutions, but we feel that TEC fits the important role of training the 90 percent who are the "have not's" thereby giving South Carolina a middle class which was non-existent in 1961. Therefore, I say to you

with all humility that the title of my talk, "Bye, Bye Magnolias, Mint Julips and Baccalaureate Degrees," has been removed from South Carolina's economy because of the cooperation of all state agencies to include the Development Board, technical education, state colleges, state universities, State Tax Commission, and the positive attitude of the governmental leaders to include the Governor and the legislature working together as a team. This has brought South Carolina to the point that magnolias, mint julips and baccalaureate degrees are no longer the millstone around our necks in South Carolina that it was prior to 1961.

Thank you for this opportunity.

"THE INDUSTRIAL ANSWER TO PRODUCTIVITY THROUGH TECHNICAL EDUCATION"

Howard Jaquith, Vice President,
Research and Development,
Taylor Instrument Process Control Division
Sybron Corporation

"Technical Education and Technical Productivity - -
The Potential Winning Pair"

GOOD MORNING - AND THANK YOU FOR BRINGING SPRING TO ROCHESTER.

IN INDUSTRY - WE COULD PROVIDE A DEFINITION OF PRODUCTIVITY; DOING MORE WITH LESS, AND DOING IT FASTER ---- AND, IMPORTANTLY, IN INDUSTRY, DOING IT BETTER THAN YOUR COMPETITION.

I FULLY EXPECT THAT WHAT I SAY TO YOU THIS MORNING WILL ONLY SERVE TO REINFORCE MUCH OF WHICH YOU ALREADY KNOW FROM YOUR POSITIONS AND VANTAGE POINTS AS EDUCATORS TO: THE EXTENT THAT MY COMMENTS RAISE QUESTIONS IN YOUR MINDS, WE MAY FIND SIGNALS WHICH INDICATE NEEDED CHANGES IN DIRECTION OR EMPHASIS; TO THE EXTENT THAT MY REMARKS SEEM FAMILIAR AND COMFORTABLE, I HOPE THAT YOU WILL RESOLVE TO PERSIST AND TO IMPROVE THE RESULTS THAT TECHNICAL EDUCATION IS PRODUCING.

I THINK IT WOULD BE WELL TO FIRST GIVE YOU A BRIEF INTRODUCTION TO SYBRON, OUR PARENT CORPORATION, AND TO TAYLOR INSTRUMENT, THE UNIT OF SYBRON IN WHICH I AM EMPLOYED.

SYBRON IS PERHAPS A NAME NOT FAMILIAR TO MANY OF YOU, EVEN THOUGH IT IS ONE OF THE FORTUNE 500 COMPANIES IN TERMS OF ANNUAL SALES AND IN OTHER MEASURES. HOWEVER, SYBRON IS A RECENT STAR IN THE HORIZON, BEING FORMED ONLY IN 1968 AS A PULLING TOGETHER OF SEVERAL LARGE, RATHER DIVERSE MULTINATIONAL BUSINESSES UNDER ONE CORPORATE UMBRELLA

From my vantage point, I appreciate that Sybron is an intense user and developer of technology; that it has many of what can be called "Knowledge workers". In fact, a very high ratio of knowledge workers to total corporate employment. There are four major groups within Sybron. I will recognize first the Process Equipment Group. This is a group of companies built around the nucleus of the Pfaudler Co. and who provide glass steel tanks and other equipment for chemical, brewing, dairy and pharmaceutical processing operations. The second group in Sybron is chemical specialty. The names that come to mind are Tanatex, Ionac and Jersey State Chemical. These people develop, produce and market specialty chemicals used in the textile and marine industries. The third group in Sybron is perhaps a little more familiar to each of you since it is the health group. It includes such units as Ritter Dental, Castle for autoclaves and sterilizers, and the Kerr Mfg. Co. for dental burrs and supplies. In addition, there is an impressive chain of dental laboratories throughout the United States and Canada.

The fourth group I am much more at home with, since it is the instrumentation group. This is the old Taylor Instrument Companies augmented by some recent small, but important, acquisitions. The Instrument group deals in two significant areas.

The first is commercial products. These are the household thermometers, barometers, humidity measuring instruments which might be familiar to each of you. And, in addition, includes a medical line, particularly important being the sphygmomanometer for blood pressure measurement.

THE INDUSTRIAL PORTION OF THE INSTRUMENT GROUP IS BY FAR THE LARGER AND I BELIEVE IS THE MOST DIVERSE IN TERMS OF TECHNOLOGICAL CONTENT OF ANY SYBRON UNIT.

THE PRODUCT LINE IN INDUSTRIAL INSTRUMENTATION RANGES FROM SIMPLE INDUSTRIAL PRESSURE OR TEMPERATURE REGULATORS, VIRTUALLY OF A SELF-ACTING OR SELF-POWERED TYPE, THROUGH INCREASING RANGES OF COMPLEX PRESSURE, TEMPERATURE AND FLOW MEASURING TRANSMITTERS, RECEIVERS AND CONTROLLERS, BOTH ELECTRICAL AND PNEUMATIC, ANALYZING INSTRUMENTS FOR OXYGEN, PANEL BOARD SYSTEMS, IN WHICH MANY UNIT TRANSMITTERS AND CONTROLLERS ARE INTEGRATED, AND FINALLY COMPLEX AND RATHER ADVANCED ELECTRONIC AND COMPUTER SYSTEMS INVOLVING HARDWARE, CUSTOM AND STANDARD SOFTWARE, PERIPHERALS, AND IMPORTANTLY, PEOPLEWARE: THAT IS, SYSTEMS ENGINEERING, CONSULTATION AND EXPERTISE.

NOW, WITHIN SYBRON AND IN FACT WITHIN THE INSTRUMENT GROUP THE RANGE OF TECHNOLOGIES APPLIED VARIES FROM MECHANICS TO THE LATEST IN MICROELECTRONICS: FROM GLASS CHEMISTRY TO INK MAKING, FROM SIMPLE WELDING AND BRAZING THROUGH INTRICATE SOFTWARE DEVELOPMENT AND TEST. AND IN ANY STAGE OF THE APPLICATION OF EACH OF THESE TECHNOLOGIES, WE ARE SIMULTANEOUSLY USERS AND DEVELOPERS OF THAT TECHNOLOGY. THAT FACT GIVES ME AND OUR COMPANY AN INHERENT INTEREST IN AND A COMMITMENT TO A GOOD TECHNICAL EDUCATION. WITH THIS STRONG INTEREST AND, IN FACT, DEPENDENCY ON TECHNICAL EDUCATION, LET'S LOOK AT HOW WE TRY TO INTERFACE WITH THE TECHNICAL EDUCATORS: HOW WE TRY TO INFLUENCE THEM TO HELP US MORE.

I THINK WE ARE SEEKING HELP FROM TECHNICAL EDUCATION IN AT LEAST FOUR ARENAS. I SHALL NAME THEM, THEN COME BACK TO DISCUSS EACH ONE.

1) THE BASIC EDUCATION THAT SOMEONE MIGHT TAKE IN A TWO- OR FOUR-YEAR COLLEGE;

2) AN EXTENSION OF OR IMPROVEMENT IN, COOPERATIVE EDUCATION PROGRAMS;

3) SEMINARS ORGANIZED AROUND TOPICS AND SUBJECTS OF CURRENT INTEREST AND WHICH WILL PROVIDE AN OVERVIEW AND AN APPRECIATION OF MANY PEOPLE OF THE NEW FRONTIERS OF TECHNOLOGY AND THE DIRECTIONS IN WHICH THINGS ARE GOING. AND

4) FINALLY, EFFECTIVE EXTENSION COURSES GIVEN IN THE LATE AFTERNOON, EVENINGS OR SATURDAYS WHICH WILL PROVIDE A DETAILED IN-DEPTH FOLLOW-ON TO THOSE SEMINARS WHICH WILL ASSIST US IN KEEPING OUR TECHNICAL PEOPLE UP-TO-DATE, KEEPING THEM CHALLENGED, KEEPING THEM THINKING AND KEEPING THEM AWARE OF WHAT IS GOING ON.

LET'S TOUCH ON EACH OF THESE FOUR BRIEFLY.

FIRST, WHAT DO WE REALLY LOOK FOR IN A GOOD BASIC EDUCATION PROGRAM IN A TWO-OR FOUR-YEAR COLLEGE. WE ARE OBVIOUSLY LOOKING FOR, FIRST OF ALL, A FOUNDATION IN TECHNOLOGY. A GOOD UNDERSTANDING OF THE BASICS; BASICS BOTH TECHNICAL IN TERMS OF SCIENCE OR TECHNOLOGY, AND BASICS IN TERMS OF COMMUNICATING SKILLS, BOTH WRITTEN AND VERBAL. AND, IN FACT, BEYOND THE BASIC CORE PROGRAM, WE ARE LOOKING REALLY FOR AN AUGMENTATION.

IF YOU VISUALIZE THE CORE PROGRAM AS A CIRCLE, WE WOULD BE LOOKING FOR A BUMP AND A SPIKE, OR SEVERAL BUMPS AND SEVERAL SPIKES EMANATING FROM THAT CIRCULAR, CENTER CORE. IN SUCH A DESIGN, THE BUMPS REPRESENT A GROWTH OF CR A BUILDING ON THAT CORE MATERIAL. THAT BUMP COULD BE DESCRIBED AS AN OPPORTUNITY FOR EACH STUDENT TO DEMONSTRATE INITIATIVE. THIS MIGHT BE VIA AN INDIVIDUAL PROJECT BUT, PERHAPS EVEN BETTER, THROUGH A SMALL GROUP PROJECT WHICH IS INTERDISCIPLINARY IN NATURE; WHERE THE PROJECT INVOLVES A BLEND OF SKILLS; WHERE THE PROJECT REPRESENTS A NEW CHALLENGE TO THE GROUP AND TO EACH INDIVIDUAL SO AS TO STIMULATE THEIR IMAGINATION AND TO PROVIDE AN OPPORTUNITY TO INTEGRATE WHAT EACH INDIVIDUAL KNOWS WITH THAT KNOWLEDGE WHICH OTHERS HAVE; WHERE THE PROJECT GIVES OPPORTUNITIES TO FIND EFFECTIVE WAYS OF BLENDING SKILLS AND WORKING TOGETHER TOWARD A COMMON OBJECTIVE; WHERE THE PROJECT REQUIRES EACH PARTICIPANT TO EXERCISE THE MODES TO EXERCISE VISUAL, GRAPHIC, ORAL AND WRITTEN COMMUNICATION TO EXPRESS THE STATEMENT OF THE PROBLEM, SOMETHING ABOUT THE METHOD OF ATTACK, SOMETHING ABOUT THE RESULT PRODUCED. THIS COMMUNICATION IN INTERDISCIPLINARY ENVIRONMENT IS INCREASINGLY IMPORTANT.

AFTER ALL, FOR MOST ORGANIZATIONS THIS KIND OF SMALL GROUP INVOLVEMENT, AND THE CONTRIBUTION OF EACH INDIVIDUAL IN THAT GROUP, REALLY DETERMINES THE SUCCESS OR PRODUCTIVITY OF A PROJECT GROUP, A TASK GROUP, A FUNCTIONAL GROUP, WHATEVER, IN INDUSTRY TODAY.

I HAVE DESCRIBED BOTH THE BUMP AND THE SPIKE, OR SEVERAL BUMPS AND SEVERAL SPIKES AROUND THIS CORE OF KNOWLEDGE. I HAVE DESCRIBED THE BUMP AS A PROJECT OPPORTUNITY, AN INTEGRATING EXPERIENCE. THE SPIKE IS THE OPPORTUNITY FOR THE STUDENT, ON HIS OWN INITIATIVE TO REACH OUT AND TO LEARN A NEW PIECE OF KNOWLEDGE -- THIS COULD BE A BIT OF RESEARCH, COULD BE A BIT OF LAB WORK IN WHICH HE IS ABLE TO DEMONSTRATE AND FULLY UNDERSTAND SOME PRINCIPLE OR TRUTH THAT GOES BEYOND THAT MATERIAL COVERED IN THE CLASSROOM, OR COVERED IN THE LECTURE ROOM, OR COVERED IN THE NORMAL LAB. THE SPIKE REPRESENTS AN OPPORTUNITY FOR THE STUDENT TO VERY EARLY REALIZE THAT HE HAS THE ABILITY, THE POSSIBILITY AND ULTIMATELY THE VERY REAL NEED, TO CONTINUE TO REACH OUT, TO CONTINUE TO LEARN ON HIS OWN INITIATIVE.

TECHNICAL PEOPLE IN INDUSTRY SELL THEIR TECHNICAL SKILL, TRAINING AND EXPERIENCE. THAT TECHNICAL SKILL IS MORE VALUABLE IF IT IS UP-TO-DATE, IF IT IS GROWING -- RATHER THAN IF IT IS OUT OF DATE OR CONTRACTING BOTH THROUGH DISUSE AND THROUGH RELATIVE GROWTH OF THE ENTIRE BODY OF TECHNOLOGY.

ONE OF THE THINGS OUR COMPANY IS DOING TO IMPROVE THE BASIC OR CORE EDUCATION IS TO ENCOURAGE ITS INTERMEDIATE AND ITS SENIOR STAFF MEMBERS TO TAKE PART IN ADVISORY COMMITTEES, CURRICULUM COMMITTEES, ALUMNI COMMITTEES THAT ARE ASSOCIATED WITH LOCAL TECHNICAL INSTITUTIONS. WE DON'T NECESSARILY KNOCK ON INSTITUTIONS' DOORS, BUT WHEN WE ARE ASKED, WE FIND WAYS TO PROVIDE ONE OR MORE EFFECTIVE REPRESENTATIVES, WE GIVE THOSE REPRESENTATIVES TIME TO DO WHAT IS REQUIRED, AND FURTHER WE ENCOURAGE THEM TO TAKE NOT ONLY THEIR OWN

IDEAS AND OWN EXPERIENCES. BUT TO TALK WITH OTHERS IN OUR ORGANIZATION WHOSE OPINION OR EXPERIENCE THEY WOULD VALUE AND COULD BRING A NEW PERSPECTIVE TO PARTICULAR PROBLEMS.

FOR A COMPANY, I CAN'T REALLY SAY HOW WIDESPREAD THIS REPRESENTATION IS, BUT I KNOW THAT WITHIN MY OWN DEPARTMENT OF 250, WE HAVE THREE SUCH REPRESENTATIVES IN TWO AREA SCHOOLS. IN THE PAST, WE HAVE ALSO PROPOSED PROJECTS AND SERVED ON EVALUATION COMMITTEES FOR THOSE PROJECTS.

WE HAVE MADE FACULTY SUMMER JOBS AVAILABLE ON OCCASION OF STRONG MUTUAL INTEREST. WE OFFER PLANT TOURS TO FACULTY MEMBERS. IN ADDITION, WE TAKE OPPORTUNITY TO COMMENT ON CURRICULA, SOMETIMES THE QUALITY OF INSTRUCTION, SOMETIMES THE QUALITY OF THE INSTRUCTORS AT IMPORTANT OPPORTUNITIES WE HAVE WHEN DEALING WITH AN EDUCATIONAL INSTITUTION. WE DO THIS AT EACH OPPORTUNITY AND, IMPORTANTLY, AT THE TIME WE ARE INTERVIEWING CANDIDATES FOR ENTRANCE JOBS INTO INDUSTRY.

THE SECOND THING WE ARE LOOKING TO TECHNICAL EDUCATORS FOR IS AN EXTENSION OF COOPERATIVE PROGRAMS, WORK AND LEARN. THIS NEED OR DESIRE MAY WELL BE TIED IN WITH THE FIRST. IT CERTAINLY IS NOT EASY TO PROVIDE A FEW OR EVEN ONE PROJECT EXPERIENCE IN A TWO-YEAR COLLEGE. IT IS TOUGH ENOUGH IN A FOUR-YEAR COLLEGE. SO AT LEAST IN OUR COMPANY WE ARE IDENTIFYING MORE AND MORE WITH COOPERATIVE PROGRAMS IN WHICH THE STUDENT INTERWEAVES HIS FORMAL CLASSROOM TRAINING WITH ACTUAL INDUSTRIAL EXPERIENCE. SUCH COOPERATIVE PROGRAMS DO FORCE THE INDIVIDUAL TO PERFORM IN A GROUP; TO ADDRESS A FRESH

PROBLEM OR A SERIES OF FRESH PROBLEMS, AND OFTEN IN A NEW ENVIRONMENT; TO LEARN BOTH ON HIS OWN INITIATIVE AND FROM OTHERS; TO INTEGRATE HIS FORMER LEARNING AND KNOWLEDGE WITH HIS PRESENT LEARNING AND KNOWLEDGE; AND TO APPLY THEM TOWARD CONSTRUCTIVE SOLUTIONS TO HIS ASSIGNED PROBLEMS; AND TO COMMUNICATE TWO WAYS, IN THREE OR FOUR MODES, ABOUT THE CONCLUSIONS HE HAS REACHED, ABOUT THE NATURE OF THE PROBLEM, THE NATURE OF THE SOLUTION AND HIS RECOMMENDATIONS OR WHAT HE HAS DONE ABOUT IT.

IN THE COOPERATIVE PROGRAM, WE FORMERLY WORKED BOTH WITH TWO-YEAR AND FOUR-YEAR COLLEGES. AT THE PRESENT TIME, WE ARE WORKING EXCLUSIVELY WITH FOUR-YEAR COLLEGES. I THINK THIS CHANGE OCCURRED BECAUSE OF OUR RELATIVELY GREATER NEED FOR WELL-GROUNDED PROFESSIONALS. HOWEVER, WE DO RECOGNIZE THE DIFFICULTY IN HAVING A MEANINGFUL COOPERATIVE PROGRAM IN SUCH A SHORT TIME SPAN AS TWO YEARS. WE LIKE THE FIVE-YEAR COOPERATIVE PROGRAMS WHICH INTERLEAVE INDUSTRY AND SCHOOL EXPERIENCE IN THE LAST THREE YEARS OF TRAINING; WE FIND THEM VERY EFFECTIVE. AGAIN, AS A MEASURE OF OUR PARTICIPATION IN THIS, AT THE PRESENT TIME 5% OF MY STAFF ARE COOPERATIVE STUDENTS.

WE LOOK ON THE COOPERATIVE PROGRAM NOT ONLY AS AN OPPORTUNITY TO HELP STUDENTS AS INDIVIDUALS, BUT ALSO AS A WAY FOR THOSE INDIVIDUALS TO CARRY BACK TO SCHOOL AND TO THE EDUCATORS, THE STUDENTS' IMPRESSION OF INDUSTRY, THEIR IMPRESSION OF WHAT IT IS THAT INDUSTRY NEEDS AND THEIR IMPRESSION OF HOW WELL PREPARED THEY ARE, OR HOW

UNPREPARED THEY ARE, TO ENTER INDUSTRY AND TO MAKE A CONTRIBUTION EARLY.

FROM THE SELFISH VIEWPOINT, WE ALSO LOOK ON THE COOPERATIVE PROGRAM AS A WAY TO MAKE MUCH MORE INTELLIGENT RECRUITMENT DECISIONS WHEN THE GREAT DAY COMES AND THE STUDENT IS READY FOR GRADUATION, READY FOR A JOB, READY TO GO TO WORK.

THE THIRD THING WE ARE LOOKING FOR FROMTECHNICAL EDUCATION IS THE ORGANIZATION AND PRESENTATION OF EFFECTIVE SEMINARS ON TECHNICAL TOPICS OF CURRENT INTEREST. I CHALLENGE YOU THAT YOU ARE DOING TOO LITTLE. I DON'T MEAN TO SAY THAT THERE AREN'T A LOT OF SEMINARS OUT THERE - THERE ARE. THEY ARE OFFERED TODAY BY LOCAL CHAPTERS OF TECHNICAL SOCIETIES, BY VENDORS WHETHER LOCAL OR NATIONAL, BY NATIONAL TECHNICAL SOCIETIES, BY COMPANIES IN THE BUSINESS OF TECHNICAL EDUCATION, AS WELL AS BY TWO- AND FOUR-YEAR COLLEGES.

HOWEVER, THESE AVAILABLE SEMINARS ARE OFTEN DEFICIENT. THEY ARE OFTEN BIASED BECAUSE THE LOCAL TECHNICAL SOCIETY OR THE VENDOR ARE SPEAKING FROM A NARROW, OFTEN PARTISAN AND COMMERCIAL, VIEWPOINT. IT IS VERY HARD IN SUCH SEMINARS TO GET THE BROAD AND OBJECTIVE VIEWPOINT OF DEVELOPMENTS AND THEIR SIGNIFICANCE. THAT TOO OFTEN THE MESSAGE IS, "YOU WANT A MICROPROCESSOR, BUY BRAND X"; "IF YOU WANT A WELDER, BUY BRAND M". AT THE NATIONAL SOCIETY LEVEL, SEMINARS ARE OFTEN CONTAMINATED WITH THE SAME COMMERCIALISM. AS AN OFFSET FOR THIS, SOCIETIES OFTEN PUT ON PANEL DISCUSSIONS AND THEY SET STANDARDS FOR PRESENTATIONS. THESE HELP TO REDUCE SOME OF THE

COMMERCIAL BIAS, AND BEGIN TO PRESENT AN OVERVIEW. THE QUALITY OF SUCH PROGRAMS RANGES FROM INDIFFERENT TO VERY GOOD. I THINK IT DEPENDS ON THE SUBJECT MATTER, ON THE EXPERTISE OR LACK OF IT OF THE PANEL MEMBERS, AND IMPORTANTLY UPON THE INTERACTION OF THE AUDIENCE. FROM INDUSTRY'S VIEWPOINT THOUGH, THESE CONFERENCES ARE NOT DOING THE JOB. THEY OCCUR TOO INFREQUENTLY AND IT'S TOO EXPENSIVE IN TERMS OF TRAVEL AND LODGING COSTS, AND IN TERMS OF PERSONNEL TIME AWAY FROM THE JOB TO KEEP A STAFF TECHNICALLY CURRENT THROUGH THIS CHANNEL.

THAT LEAVES THE LOCAL INSTITUTIONS. THE TECHNICAL EDUCATORS, LOCALLY. A BIG FIELD FOR ACTIVITY. I THINK THAT OUR COMPANY IS PERHAPS DOING TOO LITTLE HERE TO URGE, TO PUSH, AND TO SUGGEST APPROPRIATE SUBJECT MATTER FOR SUCH SEMINARS. I WILL WRITE MYSELF A NOTE TO DO BETTER IN THIS REGARD.

I THINK THERE IS A BIG FIELD HERE AND I THINK THAT THE TECHNICAL EDUCATIONAL COMMUNITIES LOCALLY COULD REALLY FILL THAT NEED. THE PROBLEM IS NOT ONLY TO IDENTIFY THE SUBJECT MATTER, BUT ALSO TO ENSURE THAT YOUR FACULTY MEMBERS ARE UP-TO-DATE, ARE NOT BIASED IN THEIR VIEWPOINTS, ARE REALLY PREPARED TO DO THE OVERVIEW, THE GENERAL EDUCATION JOB.

FINALLY, I WOULD LIKE TO TALK ABOUT EXTENSION EDUCATION -- NIGHT SCHOOL OR SATURDAY SCHOOL. IN OUR COMPANY WE REALLY RELY ON THIS TO KEEP OUR TECHNICAL STAFF UP-TO-DATE. LAST YEAR 22% OF THE PEOPLE IN MY DEPARTMENT, MANY OF WHOM ARE NOT PROFESSIONALS, TOOK

ONE OR MORE TECHNICAL EXTENSION COURSES. THE 22% ISN'T NECESSARILY ENOUGH AND THE 22% DIDN'T NECESSARILY TAKE ALL THE RIGHT MATERIAL, BUT THE POINT IS THAT THEY RECOGNIZED THEIR NEED TO CONTINUALLY BROADEN THEMSELVES, TO EXPAND THEIR TECHNICAL UNDERSTANDING AND HORIZON, AND THEY DID SOMETHING ABOUT IT. WE SUPPORT THESE PROGRAMS THROUGH A FULL TUITION REFUND PROGRAM AS MANY OF THE COMPANIES IN THE AREA DO. WE ALSO OCCASIONALLY HAVE THE OPPORTUNITY TO HELP IN SUPPLYING FROM OUR EMPLOYEES, PART-TIME BUT SKILLED INSTRUCTORS FOR SUCH COURSES. WHILE I NORMALLY DON'T ENCOURAGE MY PEOPLE TO MOONLIGHT, I DO VIEW PRESENTING AN EFFECTIVE COURSE IN A TECHNICAL SCHOOL IN A SOMEWHAT DIFFERENT LIGHT. THAT MAY BE STARLIGHT RATHER THAN MOONLIGHT.

I THINK THOUGH, THE MOST IMPORTANT WAY IN WHICH WE PROMOTE THIS IS THROUGH INDIVIDUAL REVIEW AND COUNSELING OF EACH EMPLOYEE. THIS IS A PART OF OUR NORMAL ADMINISTRATIVE ROUTINES. AN IMPORTANT RESPONSIBILITY IN INDUSTRY IS TO BUILD PEOPLE, AND TO BUILD ORGANIZATIONS OF WHICH PEOPLE ARE THE KEY ELEMENT. THIS MEANS EVER-GROWING, EVER-INCREASING, EVER-OUTREACHING TECHNICAL KNOWLEDGE SO THAT WE HAVE ON TAP THE SKILLS, THE IDEAS, THE EXPERIENCE AVAILABLE, IN PLACE AND RECOGNIZABLE, WHEN THE PROBLEM SURFACES THAT WE MUST SOLVE.

IN THIS COUNSELING, WE ARE SOMETIMES ONLY SUGGESTIVE, BUT INCREASINGLY WE ARE BECOMING DIRECTIVE. WE ARE TRYING TO HELP EACH INDIVIDUAL TO RECOGNIZE HIS RESPONSIBILITY TO STAY UP-TO-DATE, HIS RESPONSIBILITY TO GROW, HIS RESPONSIBILITY TO QUESTION AND TO EVER LEARN. FOR THIS ROUTE TO BE REALLY EFFECTIVE, WE NEED HELP FROM YOU.

WE NEED HELP INITIALLY RIGHT BACK AT THE BASICS AGAIN. WHEN A STUDENT GETS HIS TWO-YEAR OR FOUR-YEAR CERTIFICATE OR DIPLOMA, HE MUST UNDERSTAND THAT IS JUST FOR STARTERS - THAT TO BE EFFECTIVE IN MOST TECHNICAL FIELDS TODAY, HE MUST CONTINUALLY LEARN. WE NEED HELP FROM YOU TO IMPRESS THAT ON YOUR STUDENTS, STARTING THE FIRST DAY THEY WALK IN AND NOT ENDING THE LAST DAY THEY WALK OUT: THEY OUGHT TO BE COMING BACK TIME AND AGAIN FOR THE GOOD SEMINARS AND THE GOOD COURSES THAT YOU ARE GOING TO OFFER. YOU NEED TO IMBUE A REAL UNDERSTANDING AND APPRECIATION OF HIS RESPONSIBILITIES TO DO THIS. IF THIS IS GOING TO HAPPEN, ALSO, WE NEED INCREASINGLY EFFECTIVE STANDARDS FOR THOSE PART-TIME INSTRUCTORS WHO OUTLINE, PREPARE AND PRESENT THESE EXTENSION COURSES. IF YOU HAVE DONE YOUR HOMEWORK, IF YOU HAVE DONE A GOOD JOB IN CREATING THE BASIC UNDERSTANDING, IF WE DO A REASONABLE JOB IN CONTINUALLY REINFORCING ON THE INDIVIDUAL HIS NEED FOR ADDITIONAL TRAINING AND GIVING HIM A SENSE OF DIRECTION IN WHICH THAT TRAINING COULD PROFITABLY TAKE PLACE FOR HIM AND FOR THE ORGANIZATION, AND THEN, IF YOU DO AN EFFECTIVE JOB IN PRESENTING THE MATERIAL, WE WILL AVOID THAT OFTEN OVERUSED WORD BUT NONETHELESS SERIOUS PROBLEM OF TECHNICAL OBSOLESCENCE. YOUR JOB ISN'T DONE AFTER TWO OR FOUR YEARS - WE NEED HELP ---- CONTINUALLY.

I HAVE THUS FAR NOT REALLY MENTIONED PRODUCTIVITY, FOR SEVERAL REASONS. ONE IS THAT I AM UNCOMFORTABLE WITH IT. WE ARE TALKING ABOUT KNOWLEDGE WORKERS. IT IS REALLY VERY DIFFICULT TO GET EFFECTIVE MEASURES OF PRODUCTIVITY OF SUCH PEOPLE EXCEPT IN VERY NARROW SENSES. IN FACT I DON'T KNOW OF ANY GOOD OVERALL MEASURES OF PRODUCTIVITY OF TECHNICAL WORKERS, EVEN IF THEY ARE DOING TROUBLE-

SHOOTING ON AN ASSEMBLY LINE. I THINK THERE ARE NO GOOD MEASURES. MAYBE THAT IS ONE OF THE THINGS EVERYONE OUGHT TO BE WORKING HARDER ON.

THE IMPORTANT THING, THOUGH, IS THAT I BELIEVE, OUR ORGANIZATION BELIEVES AND I HOPE YOU BELIEVE, THAT ONE WHO HAS THE BASICS, WHO HAS A BROADENING UNDERSTANDING BEYOND HIS NARROW AREA OF SPECIALTY, WHO HAS SOME WORTHWHILE EXPERIENCE (SOME OF WHICH HE HAS GOTTEN ON HIS OWN INITIATIVE AND DRIVE), AND WHO IS CONTINUING TO LEARN AND REACH OUT, IS GOING TO BE MORE CONTRIBUTING, A MORE PRODUCTIVE INDIVIDUAL ON HIS OWN AND A PART OF AN ORGANIZATION THAN ONE WHO LACKS THOSE ATTRIBUTES.

I AM SAYING WE ARE PROCEEDING ON FAITH, LET'S PERSIST ON THAT FAITH AND FIND BETTER WAYS TO DO THE JOB.

THANK YOU.

HOWARD R. JAQUITH
VICE PRESIDENT - RESEARCH & DEVELOPMENT

HRJ:c
3/24/76

"AN OVERVIEW OF CO-OP EDUCATION"

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When we talk about co-operative education we're talking about an education methodology that incorporates some kind of off-campus experience into the total educational program of the student. That is the most simple and basic definition that you can give, so it involves something other than the usual lectures, laboratories and seminars. It sends the students off-campus and these experiences are integrated by the faculty of the institution into the total educational program of the student.

There are two things that I would look for to determine whether a co-op program is in fact that, or whether it's just a part-time work program. One, whatever that off-campus experience is, (and most frequently but not necessarily, it is paid employment but it can be volunteer work, too) it is an essential requirement for the degree, diploma or the certificate that will be awarded by the educational institution, and not just something added on in vacation periods. Rather, it is considered an integral part of the educational process, and success or failure on the part of the student in that off-campus experience is part of the requirement for completion of the academic program. As you will see in a moment, when I talk a little more about that, it sometimes even contains an academic credit in the sense of semester hours or credit hours, but it doesn't have to contain that currency of higher education in order to be part of the degree requirements. Also, I look to see whether or not something happens to a student who fails during the off-campus experience, as well as the student who is extremely successful or does the job, has his success reflected

in the registrar's reports, the grade and achievement records back at the institution. So that's the first thing: the experience is part of the requirement for graduation from the institution.

The second thing is that the educational institution itself, usually through faculty coordinators, take the responsibility for making sure that the experience is, in fact, an integral part of the students' education program. That often gets translated into meaning that the job is related in some way to what the student is studying. If he or she is studying engineering, the off-campus experience is in engineering: if they're studying nursing, it's in a hospital or in a nursing type position. But, it can be also related to career objectives which can be quite different from what the student is studying. For instance, if you are dealing with liberal arts students. That's probably not so much the concern of the group assembled here today, but a general audience on education would be concerned because there are students who are majoring in philosophy, languages, history, or political science, whose career objectives are to go into investment banking, journalism, foundation work, or federal government work. Therefore, the job experience sometimes can be related to the students' career objective, and that career objective may be quite different from what the student is majoring in on campus.

There are usually two basic assumptions or observations about students that are made by an educational institution when it decides to go into a co-op education program. One, that every student that's moving through any kind of an educational program is hopefully going into some kind of employment at the end of the line: a professional career; or some kind of a career; and that there are certain factors that would prepare a person for every type of career that cannot be taught entirely in a classroom setting. Working side by side with professionals or experienced people in the field is a very important ingredient in the preparation

of the individual. The internship for physicians and the practice teaching for students in education before becoming certified teachers are examples of a recognition on the part of some professions that the practical experience is an important part of career preparation.

The second observation is that most students find it necessary to work in order to earn some money to help pay for their education. All of you probably did so when you went through school: you worked evenings and late afternoons; weekends and vacation periods; doing all kinds of jobs: working in grocery stores; filling stations; baby sitting. In most cases, these part-time jobs and position, have nothing to do with the student's educational program. They are not related to their career objectives and they are not related to what they are studying on campus.

So, if these two observations are true and students are in fact going to work even more so today, with the high cost of education, and if, in fact, it takes some kind of experience to round out an educational program, then why not have an educational system or educational methodology where work experience becomes an integral part of it?

Many educators, when you talk to them in groups such this, say, "well that makes some sense. Let's do that, but let's find the jobs in the summer vacation period, that long time from June to September, when all students are free; or at the Christmas break, or even at the Easter break." The problem is that business and industry are not necessarily set up on cycles where they can use more employees during those periods of time. Certainly the resort industries are, and that is one of the classic uses of students. But many of the businesses and industries are just not able to take on a tremendous number of students during the summer, at Christmas time, or at any other particular time in the year because their business is a continous year-round operation. So, as an

educator, you come to the conclusion that you have to set up some kind of a very special calendar to do this. The best way is to split the student body that is going to participate in the program into two equal groups. While one is at work, the other is on campus; at periodic intervals they would change places. That is the key that opens the door to many, many jobs in business and industry, because you can guarantee 52 weeks of the year covered by a pair of students in any one single job. That was the key that, some 60 or 70 years ago, Herman Snyder discovered, that began the modern development of cooperative education programs in higher education.

The cycling takes many different forms, as I said. The extremes are from half days in many community colleges, with the two students on a half-day basis, to one institution, Tennessee Tech, where they go out for a full twelve months. One student is on the job for 12 months while his counterpart is on campus for 12 months, then they change places.

The most common patterns you will run into will be either the quarter system dividing the 52 weeks of the year into four thirteen-week segments or a semester system which is the common academic calendar in existence in many institutions. It is built around a 16-week system, with 3 sixteen-week semesters, or a tri-mester program with 4 weeks and a vacation that can be spread throughout the year or put altogether in the summertime. There are various ways of working out the calendar. But the common patterns among co-operative education institutions would either be the quarter system or the semester system, with a tremendous growth in recent years in community colleges with respect to what is called the parallel system, or the "part day" programs where the alternation patter occurs within each day.

have all of the scars and the hangups of the oldline institutions that have gone through the years trying to struggle for a place in the sun. The newer institutions have boldly offered academic credit, so that today among these 970, almost 70% offer the currency of higher education (that is, credit hours or semester hours) for the experience students gain out in business, industry, or in the professions.

Now, once you begin to talk about giving credit, and therefore, taking fewer courses now for the degree you see that makes it the real meaningful kind of credit. When this credit is in lieu or in substitute for specific courses on campus, then you open up some of the possibilities. You open up the possibility of what has developed in so many community colleges with the parallel kind of co-op education. Part-time work instead of the pure alternating pattern with students working part of the day, and going to school part of the day, with academic credit earned for that part where they work two years has come into play with the academic credit aspect. It is known as "extended day co-operative education." That's the adult or evening student, who work full time during the day and elect to go to school at night, taking usually 7 or 8 years perhaps to get their baccalaureal degree at a rate of 2 or 3 nights a week. Now they too can apply for credit for their experience on their full time job during the day, provided that job has an educational content and in fact is related in some way to what they are studying or what their long range career objective is. That is, the student who is working for a engineering company and is pursuing an engineering degree could get credit. If that student were a bus driver taking an engineering program in order to advance himself later, he would not get credit for the bus driving job. There is a qualitative test that would be applied by the institution before credit would be allowed.

The academic credit issue I mentioned earlier has, until recently in the growth of co-op education, been a very modest, slow growth up until about 15 years ago. We went from the University of Cincinnati, where it was founded by Snyder, just after the turn of the century, up until about 15 years ago, with about 30 to 40 institutions.

Rochester Institute of Technology incidentally, right here in Rochester would have been one of the early pioneers in co-op education, coming in somewhere between 1910 and 1916. Anyway, it was a very slow growth with about 30 or 40 colleges. Then, all of a sudden about 15 years ago co-op education caught on for a variety of reasons for which there isn't the time to name.

Now we're up to the point where we have a listing of 970 colleges and universities, including community colleges, with co-op programs. The recent funding from the Office of education is going to add another 133 that I know of, bringing to well over 1,000 the next listing of cooperative education institutions. So you see, it has been a very dramatic growth, a very fast growth, with a tremendous surge of interest over these part 15 years. Now this growth has caused some changes in the program. The basic concept of co-op education was the alternating periods, semester or quarters with no academic credit given for the experience off-campus. The stretching out of the program in a conventional four-year baccalaureal program would be a 5 year baccalaureal degree under a co-op program, because when you intersperce all of these off-campus quarters of necessity, it lengthens out the program. Usually, in a community college or a technical institute, a two year program would become a three year program. Again, because you intersperce these off-campus experiences in the curriculum and yet try to hold the same academic requirements for the degree to meet the accrediting body requirements in the particular chosen field. With this great growth over the last 15 have come many new institutions into co-op that do not

From the student's point of view, there are really four different reasons why they might come into co-op. I think it is important from either the employers point of view or the educators point of view to realize what these four objectives are. The first one is, why would a high school student select, either in a community college or a senior college, a co-operative education program? One, is to go through a training program. That is the one I have put much emphasis on already today where the job, the off-campus experience is very directly related to the student's career or to whatever their education major is. The engineer in the engineering lab, the nurse in the hospital, the pharmacist in the pharmacy, or the accounting student working for an accounting firm. This leads to progressive experience, increasing responsibility, increasing pay and is the typical classic mode of co-op education. That's the kind of vision that most people have if you ask them what is cooperative education program. The second reason for going to a co-op school would be to use it as a series of probes or tests of the individual's abilites, interests against real jobs. The student may not have a fixed vocational or professional objective, is not sure what he or she would like to do after graduation, and would like to test out different occupations. Now those jobs are harder to come by in industry, and businesses are less inclined to hire those students who cannot make a long range commitment. They are trying the banking industry, or they're trying manufacturing, or they're trying the retail business, but along the way a happy marriage can occur and then that student goes into a training program. So they are not mutally exclusive. A student can really move from one to another as they move through the program depending on the number of periods and whether it's just a short community college program or a longer baccalaureate program.

The third reason, would not be of much interest to this group, but I must mention it. That is where the student, generally in a liberal arts institution, would like to use these off-campus experiences for a series of life experiences, enlightenment, if you will, to add a whole new dimension to the basis of a liberal education. This would be where the student goes out to San Francisco, if they were born and brought up here in Rochester, for the first work period, and might be a dishwasher. The content of the job is not important in the life-experience. It's whether they get totally emersed in the San Francisco or Californian culture. Do they try to find out what makes the Californians tick? Why are they different from people from Rochester in the way they think economically, politically and socially? The next period after that would be in Dallas, Tx., to do the same thing with the southwest. Then maybe up in Boston for the New Englanders, and the next term in France or West Germany or South America. And you can see as a result of that series of experiences, there is in fact, the true enrichment of a liberal education. It is very difficult, however, to come up with the positions or at least the reasonably paid position. So many of them become volunteer assignments under that kind of program.

The fourth reason for a high school student selecting a co-op program is as a source of income and must not be disregarded as a very important one. Youngsters from a working class family, partically youngsters from minority groups, from underprivileged areas of cities, have found this as an excellent means because these are mostly paid jobs. It they do come from a city area and can work reasonably close to their homes, so that they can commute and save the maximum amount of money, then the student would find that the program would yield a financial return that would allow the educational program to be paid for, whether it be in a public institution or private.

Incidentally, the average co-op pay for all co-op students, (there are about 200,000 co-op students at the moment in higher education programs) runs about $131 a week, with a range running from about $60 a week up to some of the engineering students who make as much as $250 in their senior year. At the average, students earn some $3200 a year (gross), with 200,000 students, that is something in excess of $600,000 a year that would be the payroll of students involved. So it is not an insignificant amount of financial assistance to students You can imagine what kind of an endowment we would have to have to produce that kind of a financial return to the students.

There has been a program, that has been one of the reasons why, during that 15 year period, the federal government became very much interested in co-op education and began to see it as a very worthwhile kind of educational program both from the financial aid point of view and from the return that it gives to students in the way of experience blending the practical as well as the theoretical. So the U.S. Office of Education had money made available to it by the Higher Education Act of 1965, and the amendments of '68 and '72. The amendments are currently being rewritten at the moment in Washington by Congress, So, over the last three years, $750,000 each year has been awarded in a series of grants to institutions to tool up for co-operative education. So, if any of you higher education institutions are interested into coming into co-op education, you can write a proposal and ask for up to $750,000 a year for three years to underwrite the costs of beginning this kind of program.

They are currently awarding the grants for this year, so you won't get a grant for this next fiscal year. The next deadline for submission if they follow the usual pattern will be October 15. So the advice is between now and October 15, contact the U.S. Office of Education, get on the list to get the application form and begin to get your proposal put together so that by the early part of the fall

you would submit and be part of the group looking for fundings for next year. For you that are community colleges or technical institutes, you also can get money through your own State Vocational Education Department. There are funds available from the Vocational Education Act.

"EDUCATION'S VIEW OF PRODUCTIVITY THROUGH CO-OP EDUCATION"

Paul Gould, Coordinator,
Industrial Co-Op Education,
Macomb Community College

In the past five years there has surfaced in the mainstream of higher education an unprecedented and unexpected notion that experience in the "real world" may benefit learning in the academic community. Career education has become the new catch word of the educational community.

As if by some magic wave of the wand an involvement with business and industry is accepted and recognized as deserving of academic credit at some of the most renowned colleges and universities through the country.

The movement has gained acceptance in the academic community on the basis of another new catch work, "accountability." The concern expresed by Boards of Trustees, Presidents, faculty and most of all students is that institutions of higher education that are not concerned today about preparing students for careers realize that they may not have an institution for tomorrow.

Survival of many institutions of higher education is a very real question on the minds of professional educators around the country.

Todays entering freshmen are equallyconcerned about what awaits them at the end of their collegiate experience, with the employment market in constant change and technology changing so rapidly there is a very real concern about built-in obsolescence, a factor so critical to every graduating senior as they don their cap and gown.

Gone are the days when the graduate schools could act as the safety valve for those who were unsure of their direction or who were under the false impression that a graduate degree would provide them immediate rise up the organization ladder.

The concept that was developed by Dr. Therman Schneider at the University of Cincinnati in 1906 has suddenly become accepted as a viable means of preparing todays young men and women for the changes of tomorrow. I guess one could say that we in the educational world are only 70 years behind time in adopting and accepting concepts that have real merit.

Nevertheless, after a passage of some 70 years, an explosion in technical knowledge, a concern of accountability of our product (the student), an economy that has moved from one extreme to another, and several other meaningful factors, a new look at academics has come upon us.

An awareness has come to higher education, "Career Education is Higher Education". Reality is upon us, gone are the days when the professor was considered the expert, his word was unchallenged by the bright faces in the lecture halls of the ivy covered towers. Todays college students are more aware, concerned and committed to an education that is meaningful and relevant to the needs of our society.

Today the business and industrial organizations of this great country are viewed in a different light than they were ten years ago. A realization that capitalism may have its jolts and that there are many problems that abound because of the system, however, as todays college students view the society

in which they live they are keenly aware that if positive change is to take place they must step to the fore front to bring about that change. To change something that you know nothing about cannot be accomplished in a constructive manner. The academic world cannot be isolated from the 'real world' if it is to survive!

We in Cooperative Education have realized this critical factor for many years, and within the past twelve years we have been thrilled and proud to bear witness to its growth, acceptance and recognition by more than 550 colleges and universities throughout this nation.

Cooperative Education is the means by which the I.Q. is directly proportional to the I. Will.

PAUL GOULD
Professor and Coordinator of Cooperative Education
Macomb County Community College
Warren, Michigan

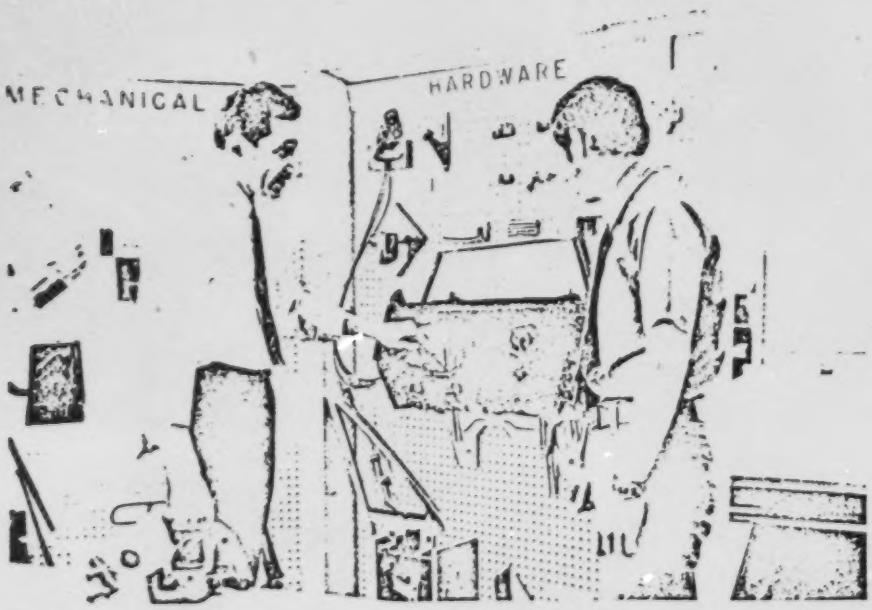
Two Steps Forward—Cooperative Education and Community College

Not many years ago, the word "education" was popularly defined in terms of the three "R's". Today many of the authorities in the educational community say there are now six R's; reading, writing, and arithmetic, and remedial reading, remedial writing, and remedial arithmetic.

In the days of the little red schoolhouse, educational opportunities for all students were fairly limited. The primary purpose was to educate the student to master the languages of words and numbers. This training was fundamental to the exercise of civic responsibility in a democratic society and formed the foundation for higher education for those who could take advantage of it.

Students who did not adjust to this kind of an educational program did not profit readily in school with these goals. If the student was poorly motivated or learned with difficulty, he did not fit the pattern and the school had little to offer him. The student soon was forced out or soon dropped out of school. As he grew into adulthood he would ultimately take his place in the world of work, performing a wide range of tasks for which little or no ability was needed. Such was the acceptable practice because the structure and the fabric of society was so patterned.

Education, in essence, was structured to consist of instructors pouring knowledge into the heads of students, and students turning it back to the instructor. However, with the demand for manpower and new skills that the educational profession had not yet come to grips with, a method to integrate the new technologies with the standard curriculum was needed. Today's education means taking together all the experiences available to today's students, whether at school or at large in the total community, and calling these total experiences education. There is the need for cooperative education. A total integration of the educational curriculum with the practices and procedures of the business and industrial community, working together to bring about a total experience education.



If we recognize the short period of time that man has been on earth and the brief span of time that written and recorded information has existed, our senses are charged by the electrifying speed at which information and knowledge becomes manifested. We in the profession of educating tomorrow's business and industrial leaders have been aware of the fact that the book is now the most outmoded form of information retrieved. Thus, new and different methods of instruction must be implemented on all levels so that quality education and instruction can be improved. The community college has committed itself to the total community, involving all resources at its command, with the ability to change and meet the demands of industry and business. The community college has provided that flexibility in an educational system that has been so inflexible in the past. The impact of technological advances in the past several years has required our colleges and universities to develop a mode of operation which is less structured, an environment providing greater specificity of action and increased exposure to the professional competencies. These changes have been met by cooperative education.

The involvement of the student in real life learning situations, and an opportunity to be able to test the theoretical with realistic conceptions of a chosen profession can only bring about a more productive and better adjusted human being, who must in turn reflect his or her success in every aspect of society.

Change—so that education may see its challenge, not only in the technical aspects of educating people to execute a task competitively, but to continue the educational imperative in teaching people how to function as human beings, while, at the same time, instilling confidence and courage that is attained by the cooperative process.

"A STUDENT'S VIEW OF CO-OP EDUCATION"

Edward J. McGee, Field Engineer
Sear-Brown Associates
Rochester, New York

I feel that a lot of today's students are very willing to do anything but they're not really sure what they're going to do or how they're going to accomplish this. Basically in high school the emphasis was on the traditional three r's, reading, writing, rithmetic. Anything related to technology, I had no knowledge about at all. I feel that a lot of the students in high school today, are like this. They don't know that much about any technical field, so as a result they come to their senior year in high school and they want to go to college. What do they take at college? What do they do? Thet pick up a college catalog and leaf through it. They see Civil Engineering Technology, Mechanical Engineering Technology, sounds interesting, I'll give it a try. The result of this is that a lot of students enroll in a technological program, not having the background or not really knowing what they're getting into. As the result, many of them try it for a semester or two and then quit. Or they complete the program, graduate, then go out into the working world and find out that what they went to school for, they don't really like doing for a living.

There is one way to combat this - through cooperative education. Now, through cooperative education the student is able to get a feel for 1) what he is going to be doing when he gets out of school. For instance he might take a course in Civil Technology, and Soils Engineering. Then, the first semester on work block, he got involved in an area where he had to go out and do some soils analysis. In this way, he was able to apply knowledge he had learned in school, to some place in the field where he could use it. This is one advantage.

2) direct application of the knowledge that he learned in school. Another advantage is that you learn about different aspects of what you're going to be working in such as; if you rake a course in Soils, you might be majoring in that, but then when you get on your work block you find that while there in nothing doing in Soils right now you do something else. Now you might like it and then again you might not like it, but the point is you're being exposed to something that is new to you and you have the chance to decide for yourself right then whether you like it or not. Then when you go back to school the next semester you might decide, well that was kind of interesting, maybe I'll focus some more of my attention towards this aspect, and broaden your scope, rather than just staying along just one narrow track. 3) cooperative education bridges the gap between reality and theory that we all learn at school. It's very easy to learn something at school, the formulas are all very nice, they all work out very nicely, and on paper they look very good. But once you get out to work you realize that a lot of this theory you're learning in school looks good on paper but it doesn't go so well in the field. I'd like to have a nickel for every time I've gone out into the field, and I've been out on inspection, when a foreman comes up to me with the set of plans and says, "who is the engineer who designed this thing!!? There is no way we can ever put it in like this". So, through the working and the going to school the student gets a feel for what he is learning in school which can be applied to work. He is learning in school what, in fact, looks good, but really isn't done that way. I could say that another advantage of the co-op program is that you just get tired of school and it's time to go to work and you get tired of work and it's time to go back to school. I don't think some of my instructors would appreciate it too much, and luckily none of my employer's are here either.

So, personally I found co-op experience very rewarding. I was able to relate things that I had learned in school to what I had learned in the field and things

that I had learned while at work back at school. I could channel different courses and take courses that I would normally never thought of taking. But because I had been exposed to different areas of engineering technology, I was able to go back to school and further my knowledge in these areas. Speaking now from an employer's point of view it also works out well in that the employer is able to get a feel for what the student is like and what his capabilities are. Personally, I was very lucky in the firm that I work for, which is Sear-Brown Engineers in Rochester. I was able to work there every co-op block that I was working. I was retained on a full time basis upon graduation from school. In this aspect, I was very lucky and I'm sure that a lot of students are fortunate enough that they have the same experience, while others probably are not or a lot don't want to go back there and work anyway. So, overall I feel the co-op experience can be beneficial both to the students and to the employer. It brings the theory of education to the realities of the real world.

"ERASING ARCHITECTURAL BARRIERS FOR THE DISABLED/HANDICAPPED"

Dr. Betty A. Brown
Miami-Dade Community College

Harry Russell, the Metro Dade County Florida Director of Community Activities for the Disabled, challenged the community to recognize and react to the needs of people with physical disabilities in his address to the county Municipal Leaders on January 3, 1975. In one brief but poignant section of his speech the unendurable duration of the predicament of the physically disabled, "the for gotten minority" (Brown, Note 1), was underscored by Russell (Note 2), in his statement that "some of the founding fathers who signed the Declaration of Independent were handicapped; it is inconceivable that they claimed 'life, liberty and the pursue of happiness' just for the able bodied."

The moment in history for the physically disabled is present and long overdue. The fabric and the framework are available upon which to build, and the consciousness level is being awaken to the point of impacting others making major decisions. On campus and out in the communities which our colleges and universities are committed to serve, are individuals who happen to have physical defects who want to be considered as "just people."

A basic premise underlying the role of the community college is the guarantee that every student has the

opportunity to succeed or fail. Although the artificial barriers of test scores and decisions of admissions officers have been removed, for the physically disabled student the barriers of prime concern are the architectural barriers in almost all physical facilities, and the problem of mobility to and from the educational institution.

Independent functioning, the primary goal of all physical disabled students, faculty, and staff is thwarted by steps, steep inclines, narrow passageways, curbs, etc. once on the campus, and of course, the difficulties in reaching the facility by public transportation.

The question arises, unfortunately in the minds of many, is it really worthwhile to educate the physically disabled? Supporting evidence from many sources is clear that once they are equipped with the necessary skills, the physically disabled can support themselves, their families, and contribute to society.

Also questioned is whether there are enough physical disabled to make the special efforts practical. Facts indicate that "with the accident rate increasing [falls, automobile, and diving accidents, bullet wounds] and modern medicine's ability to rehabilitate the victims physically, society is assured of an even greater

number of handicapped people needing modified educational facilities in the future" (Tuscher and Fox, Note 3).

According to James R. Russo's article "Mainstreaming Handicapped Students: Are Your Facilities Suitable?" approximately one out of 10 children, about seven million, have a physical and/or mental disability (Note 4). Regardless of all our efforts to help these individuals in their quest for self-actualization, man made barriers have limited the potential of these individuals more than their particular disability.

Panayiotis Psomopoulos of the Athens Center of Ekistics, Greece, wrote:

> One major cause of disabling settlements is that they are built for a non-existent population. Buildings, roads, open spaces cater to a fictitious model of the human being--exclusively for a man (not a woman) in the prime of life and the peak of his physical fitness.
>
> Statistically speaking, only a small minority of the population can fall into this category, even among the fit. Naturally, there is no thought for the handicapped. (Note 5)

One method of organizing successfully for change in our educational institutions is through the design of a master plan for the development of a total service system

for the physically disabled, with the subsystem or task force on architectural barriers playing a major role (Note 6). At Miami-Dade Community College, North Campus, progress is being made in identifying and eliminating architectural barriers through the efforts of a student study of the campus (Note 7), follow-up by North Campus faculty members in pursuit for the Ed.D (Notes 6 & 8), and the ongoing efforts of the campus subsystem on accessibility.

Architectural improvements implemented or in progress to date for the North Campus of Miami-Dade Community College include modification of restrooms in each of the main buildings, lowered telephones with volume control adaptation for the hard of hearing, ramp construction, improvement in height of learning carrels for wheelchair users in the Library and Audio-Visual Center, installation of concrete walks in four parking lots adjacent to the disabled parking areas, striped crosswalks from disabled parking areas to building areas with the installation of appropriate signs, installation of speed breakers in each of these parking areas a reasonable distance in front of the crosswalks, braille map of the campus, and the identification of all rooms on the campus in Braille.

We are by no means alone in the endeavors. Other

colleges have begun to institute innovative programs in building accessibility. Pennsylvania State University has installed push bars on the entrance doors at a height appropriate for wheelchair users; disabled students at the University of Hartford, in Connecticut, can signal for assistance by use of door buzzers outside academic buildings; light switches have been lowered at Albright College in Pennsylvania; coin slots of vending machines and coat hooks have been lowered at the University of Baltimore; electrical outlets have been installed at various locations at the University of Wisconsin to accommodate charges for battery-operated wheelchairs; a modified seating area in the football stadium at Yosemite Junior College in Modesto, California has been installed to accommodate physically disabled with regular students; and a wheelchair repair department is functioning at the University of California at Berkeley (Note 4).

The state legislature of Colorado has appropriated $1,105,000. in its first phase of a three year program to make all campuses barrier free to physically disabled students. "This will assure that, at least, one of each degree program or course of study in Colorado will be accessible somewhere within the State" (Note 9).

The criteria used in determining whether a college is barrier free are established by various local, state,

and federal codes and ordinances. Currently, a typical listing of regulations would include Public Law 90-480 as amended (when federal financing is involved); local building code (which may reflect legislation on accessibility at the state level); zoning ordinances; state and local health code; fire-safety, plumbing and electrical codes; the state educational construction authority; and insurance companies (Note 10).

Currently, in Florida, these regulations specify the standard "Specification for Making Buildings and Facilities Accessible to, and Usable by the Physically Handicapped," ANSI A117.1-1961 which was reaffirmed in 1971 (Note 11).

The problem of multiple standards under development for the elimination of architectural barriers was noted by John R. Graveley, Architect, in an article in the September 1975 issue of Achievement, The Voice of the Handicapped (Note 12). This article prompted my exchange of correspondence with various federal agencies, and the American Society of Landscape Architects Foundation. In a lengthy and comprehensive response received from James S. Jeffers, Executive Director, Architectural and Transportation Barriers Compliance Board, Washington, D.C. it was explained that ". . . the Architectural and Transportation Barriers Compliance Board will function to review

all future standards developed by the General Services Administration, the Departments of Housing and Urban Development, and Defense" (Note 13). For example, HUD has initiated a two-year, $256,000. study with Syracuse University to develop a revised American National Standard to cover public buildings and residential structures. This project will also reflect accessibility standards in the countries of Nothern Europe and incorporate research by the American Society of Landscape Architects Foundation in their report, Barrier Free Site Design (Note 14). The General Services Administration has a contract with Ezra D. Ehrenkrantz and Associates for the development of an interim accessibility standard until more comprehensive standards are forthcoming (Note 15). These studies are being undertaken because the American National Standard in question is considered to provide only minimum accessibility standards which are inadequate. Because of these inadequencies, certain other federal agencies have established their own criteria, e.g., Veterans Administration and HEW. The proliferation of federal standards which may conflict, and non-compliance, will present a problem to architects and construction firms. This was recognized at the federal level in an oversight hearing of the Subcommittee on Investigations and Public Works of the House Committee on Public Works

and Transportation, held on October 20, 1975 (Note 16). One objective of the Architectural and Transportation Barriers Compliance Board is "to identify any conflicts between federal, state, and local barriers legislation and programs; and to coordinate future plannings" (Note 17).

The scope of the current American National Standard covers criteria involving wheelchair specifications, walks, ramps, entrances, doors and doorway, floors, restrooms, water fountains, public telephones, controls, identification, and warning signals (Note 11). The new standard, which will be approved by the Architectural and Transportation Barriers Compliance Board before issuance, will expand the scope and be more specific in certain areas. For example, considerations advanced by the Barrier Free Site Design report (Note 14), include dimensions and turning requirements for small as well as large wheelchairs; gate and doorway clearances for straight walks, where walk turns with gate swing, where walk turns opposite gate swing, where walk turns and gate swings away; and illustrations of curb ramps where the design may call for a flared ramp, a ramp with continuous curbing, extended ramp, or parallel ramp. Wheelstop and post layouts for parking are also illustrated and explained, as well as the suggested location of plant

materials near outdoor ramps which may affect the melting of ice and snow from walkways and stairs (Note 14). Other examples include the location of controls for windows, draperies, heat and light switches, fire alarms, and vending machines.

Any standard must be conscious of criteria which are contradictory in design. For example, reserve parking with an unsuitable ramp leading to a building; an elevator marked with the wheelchair symbol of access where the controls are not within reach; or a lowered telephone in an area which is unaccessible to the wheelchair user because of heavy doors and/or narrow entrances (Note 18).

The question has been put forth concerning the preference of a performance code vs specification code. I believe the consensus will be a combination of both; the main factor being the inclusion of physically disabled representation in the development and review of all criteria. Physically disabled students, faculty, and staff are represented on all the subsystems of the Miami-Dade Community College, North Campus master plan (Note 6).

There is general agreement at the local, state, and federal levels that the costs are negligible when implemented during the initial stage of building. "The National League of Cities estimates the cost of incorporating

these features into new construction as only 1/10 of one percent of construction costs. In fact, in some cases money can actually be saved" (Note 19).

Another significant way to impact the area of architectural barriers is the introduction of this topic into the drafting, building and construction and architectural curriculums at all educational levels, including the two-year colleges. This is under study at Miami-Dade.

Awareness training of the college community can best be accomplished through workshops where the design of the program is explained in detail, and the participants assume a disability in a tour of the campus. This experiential experience should be planned very farefully. Pertinent information can be obtained from Ms. Coleen Fix, Coordinator of Services for/by The Physically Disabled, Miami-Dade Community College, North Campus, 11380 N.W. 27 Avenue, Miami, Florida 33167.

A vast amount has been written on the topic of architectural barriers Recognition has occurred at the local, state, and federal levels. However, now we must concentrate on the development of clear and comprehensive criteria and focus attention on the matter of non-compliance with legislation.

I have included an expanded bibliography on this

topic to assist the reader in developing and implementing a plan on his home campus; much of this material also includes extensive reference data.

A disabled faculty member from one of the colleges in the State of Florida, who will remain anonymous, wrote that "sometimes I have a terrible fantasy. I dream that I've temporarily broken the legs of all the architects in the world. For 12 months they all had to use wheelchairs. After that the world was different."

As you work to eliminate architectural barriers for the physically disabled, I hope you will find great satisfaction as you act successfully as a ". . . catalyst, . . . communicator, [and an] interpreter for people with physical disabilities" (Lewis, Note 20); and that you remain committed to erasing "the pathos of petty destinies" (Note 21), for the physically disabled who seek only educational and employment opportunities, and self-actualization through the possitive and realistic endeavor at your institution.

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"INNOVATIONS IN TECHNICAL EDUCATION:
PREPARING THE HANDICAPPED FOR PRODUCTIVE CAREERS --
AN EMERGING RESPONSIBILITY"

Dr. Jack Clarcq, Associate Dean
National Technical Institute for the Deaf
Rochester Institute of Technology
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Jack Smith is a tough act to follow. In terms of my presentation, I'll try to follow through with some concepts, where as Jack gave us some pretty good philosophical and some direction to think about in terms of technical education. Very briefly, NTID is a Federal Law, one can look at NTID as the Federal Land Grant Institute for Deaf People, whereas hearing people have access to a variety of educational experiences throughout the U.S., deaf people are extremely limited. And so, NTID can be looked at as a technical institution at the Federal Level or National Program for deaf people.

The objectives, of NTID are simply jobs, community living, and citizenship. We're interested in preparing people for work and for effective participation in community life. Being a National Institution we serve students all over the United States and its territories and presently we have something like 750 young deaf adults from across the U.S. As Jack pointed out we have a broad range of curricula, something on the order of 100 options in the Engineering, Business, Fine and Applied Arts, Health Services, Engineering areas. Ranging from 22 week certificate programs, diploma programs,a ssociate degree programs baccaluareate level programs and master degree programs. So it's quite comprehensive ranging from the technician through the professional level of accomplishment.

A paper that I'll be presenting today for those who were at the AVA Convention, Dr. Ed Maruggi and myself presented a paper at the AVA meeting in terms of some things for people to think about who are involved in technical education

particularly if they are interested in working with handicapped people. I would like to indicate that I'm very thankful to Don Lickde who is in our media design area and a professional photographer and cinematographer. He is subbing today as a technician.

I'd like to think that planners of contemporary technical vocational training programs have a challenge. I think the challenge as Jack kind of put it to us relates to designing, implementing, and evaluating of technical training programs that meet the needs of handicapped people. And also the needs of the larger society in which handicapped people will live, both on the job and off the job. We've all read about rapidly changing technology, and rapidly changing society and we know that the needs of society will change as will the needs of people. Therefore the needs of vocational training programs or the training programs themselves must change as to be responsive to a changing clientele and a changing market place. Meeting this kind of a challenge requires a lot of attention when one develops a program in the first place.

The focus of the paper today will be 1) I'll try to give you something to think about in terms of what should the focus of vocational training programs be, and 2) the effectiveness of programs supported by public monies, that are geared up to meet the needs of special purpose people. Have they been effective, or haven't they? And also a charge to vocational education to think about and in fact to develop programs that meet the needs of special clientele. Following up on some of the data Jack presented, I'll be giving you a little bit of history of the deaf person in the world of work. Talk very briefly about a practical, theoretical model for developing vocational training programs for handicapped people, and then I would like to illustrate what might be done in terms of preparing handicapped people for work by giving you some data relative to the job placement history of graduates of the NTID.

Thinking now about the focus of vocational programs. I think the focus should be providing handicapped people with experiences and skills that will enable them to earn a living and live a life. I think the program graduates must have the necessary technical personal, social and communication competencies to find jobs that are meaningful and appropriate and at the same time be prepared for personal, social and civic involvement.

As one looks across the American scene, and I think Jack Smith alluded to this, the effectiveness of programs in our social sector, supported by public monies and directed toward meeting the needs of certain people, the effectiveness of such programs has been questioned by individuals and groups throughout history. Groups representing the taxpayer, the consumer, the professional, the governmental planner at the state and federal level. Fundamentally, the question is, have such programs met the needs of the people they're designed to serve? And I personally believe that the competition for dollars, for money in the gross national product becomes more acute, I would hypothesize that this question is going to be asked with a lot more frequency, and I would also suggest that the long term if not the short term continuance of such programs is going to relate to the ability of program planners to document their answers to that fundamental question. Many programs have not been able to demonstrate that they have had impact on the people they are designed to serve. I read a volume by a professor of finance at the University of Pennsylvania. He summarized the state of the Arts succinctly when he said, and I quote "What is depressing is the discrepancy between the verbal responses and the social action necessary to convert rhetoric into fullfillment." How often have we witnessed violent eruptions in Watts, Kent State, Attica, Newark, followed by well intentioned studies, followed by what? He says very little. There is no change. So, I think what we are finding with special groups within our population is desperation. Desperation on the part of the consumers or the clients, and on the part of those people who provide the

monies to support such programs.

It can be said that the history has been written and the challenge is squarely in front of contemporary and future planners of programs related to our social system. I think our individual and collective responses to the challenge will have a direct bearing on the future of such programs. Planners must repond to this challege by careful and deliberate efforts in the areas of program planning and program evaluation. I think people involved in developing vocational training programs or technical training programs for handicapped people are not isolated from this condition. We too must respond and our responses must be constructed on the basis of careful and deliberate planning and evaluation. It's only through careful planning and documentation that our programs, particularly in the social sector will sustain themselves. I would also indicate that if we cannot demonstrate that we've had a positive impact on the population that we are charged with serving, then we should in fact not continue to receive the support. We should look for other options in terms of meeting the needs of people.

Kind of playing on the history that Jack talked about in terms of employment of the handicapped using deaf people as a reference point we know the job placement of deaf people will not happen by chance, and you can generalize across the handicapped population. The statistics are dismal. They indicate unemployment, underemployment, lack of job mobility, if in fact they find a job, and a tremendous amount of job dissatisfaction. Deaf people, like handicapped people in general, have concentrated themselves in semi-skilled and un-skilled manual occupations. Even given professional training, we find that only about 30% of deaf people trained professionally find and hold professional positions. In Connecticut and Massachussets the unemployment rate for the deaf is <u>four</u> times the unemployment rate of hearing. In Oregon, a few years ago the unemployment rate for the general population was 4%, for the deaf population it was 21%. The average annual

income for deaf people is approximately $3,000 below the average income for the general population. It's not unusual to find a deaf perosn trained as an attorney pushing a broom, or as an engineer working as a sweeper. And these data are fact. So the data suggests that the young deaf adult is underemployed, receives lower wages, and experiences unemployment to a greater extent than his or her hearing counterpart. We find that even when professional training is introduced the data remain constant. I would suggest that if we are going to reverse this history for the handicapped then we have to come up with new approaches in the process of technical training and education, including job placement. We've got to design programs that meet the needs of people, particularly their unique needs. They must be developed systematically.

Those involved in vocational education must be concerned with responsibilities in education of the handicapped. The Vocational Education Act of 1963 authorized funds to develop programs for persons with special needs that prevented them from succeeding in regular programs. We have found that there has been a lot of money available. However, we've found that its not being used in the most appropriate fashion. It's not really providing technical training for handicapped people. The Vocational Education Amendments of 1968 gave some high priority to the disadvantaged, and I think you people probably know that 15% of the money must be allocated for post-secondary programs and 10% for handicapped people, so there is a funding base. The Controller General's report to the Congress on the role of federal assistance for Vocational Education indicated that although expanded vocational opportunities have been made available for disadvant..ged and handicapped, the persons with special needs have not been given priority attention at the state and local level. In other words there is federal support but it's not being backed up by state and local support. There is tremendous concern in terms of the total numbers of handicapped people being served given the population. The Controller General's report went on to say,

and made a recommendation to the Congress that programs and services for handicapped people in higher education should receive prioity attention if the states are willing to also demonstrate such a priority.

So I would suggest that the stage is set for us, that is, for the competition for money available today to support programs, geared to improving the condition of people. It is and it's going to continue to become acute. There is a tremendous amount of pressure for dollars by many, many special interest groups. Questions are going to be raised with increasing frequency, is the program effectiveness by those people who fund such programs or who allocate financial resources? I don't think that the programs to support special interest groups is particularly unique. However, I think it's probably long overdue, and it's hitting all of us in higher education. The history of deaf people in the world of work in terms of job satisfaction, uppered mobility and other such variables has not been favorable. However, there is federal legislation that does provide a fiscal base, for sound programs geared to meeting the needs of the handicapped. Thus, I believe what are needed are new creative approaches for preparing handicapped people for the world of work, which in this country is the mainstream of life. I think these programs must focus first on ends and secondly on means if they are to be effective.

Let me share with you now some of my thinking on how does one approach developing vocational training for handicapped people? I think in order to prepare people who are handicapped, the function in a technological or if indeed a post-technological society, we must design, develop, implement, and evaluate vocational training programs.

I think this starts with, what are your goals? What is your mission? What are you all about? I don't think you can start without a clear understanding of what you're in the business to do. This must be well articulated with every person in the educational environment. Secondly, you have to

determine what is unique about the people that you're there to serve. Thirdly, what are the needs of employers? Then you can move into what we call curriculum design, curriculum development, the all important ingredient of job placement and program evaluation.

Too often in program development the primary attention is directed to identification and assessment of mechanics or means rather than on the assessment and identification of the distinctive needs of the people that you're there to serve; and the requirements of the larger society in which handicapped people will work and spend their leisure time in. In other words, I think many times people are more concerned with the mechanics first without ends, and I think we've got to separate that and first focus on the ends and then talk about the means, because the means are arbitrary at best.

I think the ends of a vocational training program, as I suggested earlier, are the development of technical, personal, social and communication competence. Technical competence for job mobility and job entry, personal and social competence because I think it facilitates job entry and job mobility but it also provides people with an opportunity to exist outside the world of work and communication competency for some of the reasons that Jack Smith alluded to.

The second phase in the process is to determine the clientele uniqueness. This can happen at the same time as phase one. I think you determine your client uniqueness in terms of interest, motivations, apptitudes, achievements and the like. I think program planners have to diagnose the operating levels of the people and prescribe services and experiences accordingly. In designing a program in vocational training it is crucial that program planners develop and maintain programs that are consistent with the needs and requirements as sources of employment. This is particularly important if the primary objective is to reverse history in terms of job success, economic and personal independence for handicapped people. Therefore, I think program planners have to be cognizant

of manpower projections and employment trends. And without going into these in detail, I think we're all familiar with some of the characteristics of industrial and post-industrial society, in terms of the shift from good producing to service producing industries; the kind of technology that will support this shift; the kind of manpower or people power that will be necessary to drive the technology. I think if one is interested in designing programs for handicapped people one must be aware of what the society looks like in terms of jobs, skills and compentencies necessary for people to perform in jobs. So I think we've got to, in the area of the education of the handicapped, pin-point industries and occupations and jobs that show the greatest demand for workers in the future. We've got to load the dice in favor of the handicapped person. I think we should develop programs that indicate a positive employment outlook for graduates over the short and long term. These programs must be consistent with the overall institutional mission and the needs and uinqueness of the client served. There are many ways to do this, by maintaining liaison with manpower planning groups, professional associations, industrial business, government and educational representatives, educators and other groups interested in the future labor market. The fourth step in the process is to identify the compentencies of a person once on the job. In other words what are the major technical, personal, social, and communication compentencies that a person needs to function on the job. Once these skills are identified you organize them into a curriculum. The curriculum to my way of thinking, is the set of experiences that takes a student from where he or she is to where he or she needs to be to obtain meaningful employment and job mobility, which I believe is the ultimate criterion of program success, if one looks at the history of employment of deaf people.

I think the experiences in terms of curricular activities are provided through students and they must be done in a systematic way. The fifth step,

is to organize courses and units of instruction. Here I'm talking about the developing of compentencies or in the parlance of education the behavioral objectives, learning sequences. You look at the entering characteristics of your population. You identify the prerequisites for entry into your curricula. You collect the resources necessary to generate a program and you design unique instructional materials. This phase is extremely improtant. Curriculum development, however, is part of a larger development effort. In other words, courses of instruction, text books, etc. have a necessary relationship for handicapped people at least, to jobs and skills necessary to function on jobs.

Job placement of graduates is important and is part of the whole process of designing and educational program. It has to be highly selective, as Jack Smith pointed out. You've got to work very carefully and closely with potential employers to make sure that they know the kinds of skills that the person has, and that those skills are consistent with the needs of industry. You have to be aggressive and you have to develop fresh, innovative and creative marketing strategies to place handicapped people.

At NTID we use extensive use of media in the job placement process. We mail out a focus magazine on a monthly basis to people. In a recent issue the focus dealt exclusively with employment as a way to sensitize potential employers to deaf people. I have on the table to my right some descriptive brochures and materials about our programs, some of which represent the kind of media we use with potential employers. We developed a slide-tape presentation in terms of, "Why put a deaf person on your payroll?" This dealt with three things: 1) the skills that handicapped people have 2) the highly selective nature of the placement process, 3) that with simple modifications many times in the work environment handicapped people can function.

We also developed a film called the Silent Drum. It was produced by Jack Smith. This film was designed as a key marketing tool in our job placement program.

It appealed to employers on both an intellectual and motive or effective level. We tried to do three things in the film: 1) to let people know that there are deaf people with strong interest and motivations who are technically competent, 2) that through effective use of educational and instructional technology we can assist deaf people in development of technical skills, 3) we talked about NTID as a unique environment that tries to design curricula that meets the needs of both students and employers. The film portrays the kind of skills that people have as a result of going through our program. We also use skilled profiles with employers to try to match the job with the student. So, our placement people go out with a definitive list of major technical compentencies; personal and social compentencies and in the case of our population, communication compentencies which is the crucial variable. They present this to the employer, so the employer has a pretty good sense of the kinds of compentencies and skills that the person has. So it's a one to one match between the job, an individual job that's highly selective in that sense and the student. We found that the profiles are extremely useful in providing information that employers don't typically get on handicapped people.

I like to talk about the last part of the process which is extremely crucial, and that's evaluation. And the question again is, have programs met the needs of the people their designed to serve? I think this is the fundamental question. Planners of vocational training programs must provide an objective response to that question in order to sustain themselves. We must develop criteria for evaluating our programs. Program elements design instruments for collecting data and develop procedures to provide feedback to the program implementers. Evaluation and feedback need to relate to such questions as; how well have the primary goals of the institution been met? Are the people that you're there to serve working? Are they economically independent? Are they contributing as opposed to extracting from the economy? Are they satisfied on the job? Do they have some semblance of

job mobility? What are the changing characteristics of the clientele? What are the changing characteristics of the job market? What impact do such changes have on the vocational training program in terms of curricular and other experiences? Are services being provided to people in an effective and cost efficient fashion?

At NTID we use a comprehensive curriculum process model to make sure that the programs we design are developed to meet the needs of both the students and potential employers. We know that both are going to change, so that curricula courses in units, must change to keep pace. The model focuses first on ends, second on mechanics and we build in an evaluation in the maintence phase so we can modify our ends and means on an objective base. As Jack pointed out social programs and problems are extremely complex. I believe that the process of design, development, implementation and evaluation of vocational training programs for the handicapped is part of the larger social scene and is very complex. To effectively design and implement a vocational training program for the handicapped multiple disciplinary planning and coordination is necessary. A variety of skills and viewpoints in philosophies is crucial as we apply solutions to problems before we can plan or structure a plan to resolve the problems. If we only admit one of these crucial links, managerial, sociological, curriculum, counseling, I think we're inviting trouble. The effectiveness of mulitple disciplinary planning in many sectors has demonstrated itself.

We've learned at NTID that it does take mulitple disciplinary planning and articulation for successful development of programs, implementation of programs and evaluations of programs. We also have demonstrated that in the history of the work world we can reverse the dismal employment history. We have placed over 95% of all students who have successfully completed a program of study, approximately 94% at a level commensurate with their training, so we know that it can be done. But we know that it won't happen by chance. Deaf people never

before in this country, before NTID, are functioning along side hearing people, engineers, medical technicians, photographic technicians, optical finishing technicians, accountants, machine tool operators, numerical control programmers and many other highly technical jobs. The course of history can, and is being reversed, so we know it can happen.

"EMPLOYING THE HANDICAPPED/DISABLED"

Jack Smith, Executive Director
White House Conference on
Handicapped Individuals-HEW
Washington, D.C.

Education today particularly in terms of the handicapped is really where it's at! If we are going to do anything with the lives of handicapped people it's going to be through education. Not only educating handicapped people themselves, but really impacting on those who are not handicapped and educating them. Many of the problems we have in this country really will come down in terms of solutions to an educational base.

The White House Conference was established by an Act of Congress and authorized by the President to hold conferences in every state and territory and we will have conferences nation wide in the trust territories like Samoa, Virgin Islands, Puerto Rico, all leading to a White House Conference, designed to do some very major things in this country for the first time. It's the first White House Conferences ever on the handicapped. For the first time, handicapped individuals are going to play a roll in determining really what's in their own best interests for the future. I think it is also going to have a great effect on handicapped people not just speaking out but being more accountable, not to bitch but to think of alternatives as a way to solve problems. What it really costs in terms of manpower and in terms of financial resources in problem solving.

The Conference will make a national assessment of the problems and potentials of handicapped individuals and there are more than 30 million handicapped persons in this country. It really touches 1 out of every 5 people in some way.

I am sure if you think in terms of your own life you can probably think of someone in your family with some kind of disability. Of course they may handle it in a variety of ways, and it may not be too significant because they are handling it. But there are problems which touches all of us.

We're going to develop a major national awareness of the problems and potentials. The result will be recommendations to the Congress and the President for Legislative and Administrative action for the future.

Personally, I hope that we do not see a rapid growth of new splintered programs. Frankly, that has been part of the problem in this country. Congressmen, program people in Washington sometimes react too hastily without looking at the broader picture of how we can really more effectively solve problems in a coordinated way. So we're hoping that what will come out of the Conference will be directions that will effect legislation for the next 5 to 10 years.

The educational and employment picture in this country, I would say, is rather bleak. We'll speak of some of the positive things, but I do want to share with you some of the concerns we have.

Only 40% of the children in this country that are handicapped are receiving an adequate education. It's pretty sad, in terms of the resources that are available throughout the country. 14% more of disabled people never go beyond the 8th grade. There's been recent legislation titled s-6 that is supposed to ensure the education of all handicapped young people in this country. The problem, however, becomes the implementation, and that's where educators such as yourselves play such a vital role in the future. You can have the laws, but you have to have the enforcement mechanisms and the programmatic directions that will carry them out. In terms of education our whole counseling system needs to be looked at in new ways. Most handicapped individuals when they enter the labor market are not only ill-prepared but very often they have not had the thoroughness in terms of their career planning. Part of the problem is the counseling.

Part of it is that individuals are being directed into careers that really do not have job potential. There are so many handicapped people that I have come across in this country that have degrees; masters, doctorates. They're unemployed, they have no skills, they cannot market their skills to business and industry. That's a shame, it is such a tragedy in terms of contributions that every American should be able to make. If there is anything we are facing in this country it is the lack of productivity. You can talk about recessions. We've developed in this country a way of thinking about what we're doing, and that is to do less and receive more. Somehow we have to turn that around to really think of being more productive. That's what this country has grown on. I hope we can get handicapped people, not only to think a new way, but to open up doors that will allow them to be productive in new ways.

57% of all handicapped people are unemployed. In terms of the national statistics it is three times as great as the depression of the 20's. Of those 43% employed most of them are underemployed. So many even graduating from college. Recent studies indicate that 40% of individuals who will actually graduate from college programs are placed in jobs that are really not what they are prepared for. The employment picture is changing considerably, and part of the reason is through new legislation.

Some of you may be familiar with Section 503 of the Rehabilitation Act of 1973. It really requires any company with federal contracts of $2,500 or more to file affirmative action programs to both hire and promote handicapped individuals. It has the potential to open up new doors for the handicapped.

The Vietnam Era Veterans Re-adjustment Assistance Act of 1974 really provides similar opportunities for the veterans. Labor will come out with the specific guidelines for the implementation of these programs. Yet, knowing industry, and I've been involved with industry both in terms of education and in terms of business, industry still has the right to say, "Where are the handicapped people?

How are they being prepared to fill our needs?"

Frankly, they are saying that, and educators and those people in rehabilitation in this country are saying we don't know where they are. The tragedy is that they are not being prepared. Two major reasons, I don't think in a broad way we're really preparing, in the case of the handicapped individuals, to meet the needs of business and industry. That's where it's at. In terms of a long range forecast we're not looking at the job potential. Handicapped people are going into educational programs that are absolutely dead-ended for them. Our counseling and our educational planning often bears no resemblance at all to what the real needs of business and industry are. In spite of all the technology that's being developed, we have no systematic way in terms of the handicapped of knowing nation wide what jobs are available, and how to access people to those jobs. But there are models in this country, and a few of them that I think are really standing out that have to be looked at more closely. One is the National Technical Institute for the Deaf. In looking at the programs we see that there are more than 95 careers that the deaf can go into. They're all technical careers. That's a new horizon and just as impressive is that we are not only looking to NTID at the technical skills, but to the personal and social areas. As many of you know, to really succeed in business and industry today you have to be as capable from a personal and social stand point as you are technically. That's why I'm impressed with the directions of NTID. Then the program also matches the right person with the right job. That systematic job placement program is ensuring a higher placement rate combined with programs that are really preparing students to answer the needs of industry. That combination is dynamite.

Other educational programs should be looking at how they can modify their efforts. Other technical colleges, with very little modifications, dealing with barriers; and some dealing with programs could provide many, many new opportunities in technical education that will help move the handicapped into the mainstream of

society.

We hope to do three things with the Conference; 1) greater independence of the person, 2) more dignity as a human being, 3) and greater full participation in community life.

Handicapped people because of a variety of reasons, some economic, some soical, some barriers, they're just not part of today's society. We're losing valuable contributions. I'd like to look at the things that really keep the handicapped from society or them being a part of society. It's really in terms of barriers and you all know about physical barriers. Those architectural barriers that keep people like myself from getting up on stage without any help. Physical barriers will separate man from things, but attitudinal barriers will separate man from man. There are many attitudes in this country that we have to start changing, both on the part of the handicapped, and the part of general society to start getting everyone closer together.

The physical barriers have to do with the whole society not only getting into educational institutions, but participating; being able to participate in cultural activities. Having real access to the same things that we all take for granted in our lives, in being able to get into things and be able to share in terms of cultural activities and social activities.

The attitudinal barriers become much more difficult to deal with, and I think of them in terms of my own life. I was once travelling from Rochester to Boston to Columbus. I got up in Boston. I always arrive at the airport early, I was there and I had my ticket. They ususally pre-board me, so they can put the chair below in the belly of the plane. Then I'm on and there is no problem. But I had someone come to me and say, "the crew refuses to take you!" And I said "Why, I travel all the time by myself." They said, "well, if the plane crashes, we don't want to have to explain you charred body." I said, "if the plane crashes you're not going to be able to explain anyone's charred body." "Well", they said,

"you can't get up to use the bathroom." I said, "it doesn't matter we're only an hour away from Columbus in flight time." They said, "I'm sorry, we can't take you." Finally I got Allegheny to take me. And if any of you know Allegheny, they stop at every stop along the way and a few that aren't planned. It took me 5 1/2 hours to get from Boston to Columbus without using the facilities. This is just a personal experience, but it's attitudes like that. It's attitudes like if I'm travelling with someone else for any reason. If it's my wife. My girl friend. Or my companion, whatever, and someone says to the companion, "do you have his ticket?" It's like I don't have the mental capacities. Because I'm physically handicapped, I have to be mentally handicapped.

This Conference, the White House Conference, is going to look into many, many aspects of the life cycle of a person. The health question and some of the things we are starting to wrestle with now, that every state will be working with. I hope that each of you will try to get involved with you state conference. We need people like yourselves who know what technical education can mean. They can really start changing some thinking in the area of health. We need to link, in a greater way, the diagnosis and treatment activities in order to provide greater interaction of the two. Too often we segment them and we segregate them to the point that we are not able to impact on the health question in an early enough state. As a result the whole prevention aspect gets thrown out of skew. In terms of the social aspects, we have many laws on the books to really provide the handicapped with access in terms of barriers and civil rights, but there are so many loop holes in the laws that somehow we have to look at them and tighten them up to make them more effective.

Transportation systems, how can you get to work if you can't use public transportation? And you can't drive yourself? At the same time, can we make all transportation accessible in terms of the cost benefits. Question that we can. But we can look at alternative ways to solve the problem. It may

effect the economic and tax structure because if the handicapped person cannot use public transportation, and still needs private transportation why can't we think of certain tax relief to allow them to purchase their own transportation, until we can provide the public transportation that's accessible.

In Washington, for example we're developing a new transportation system, called the METRO. This train system is really geared to access for the handicapped. But it doesn't only effect those with wheelchairs, and crutches, it effects the elderly. It effects those with heart problems, or temporary problems. So when we look at transportation in this country we must look at it in a broad perspective that it's in the best interest of the whole country.

We have an area called special concerns and we're going to look at that, not only in civil rights but its service delivery systems. The time has come that we cannot think incrementally of program additives, and incrementally in terms of finances. We're going to have to examine our present programs and say how can they be modified to do a better job. In terms of economics, we have to help move those handicapped people from poverty levels of around $3,500 a year to levels that will allow them to participate in society. So, it becomes a major economic question, but just as important will be education. We'll be looking at all areas of education from pre-school through continuing education. We'll be looking at teacher training and, as I said to you before, the real thrust in this country is in terms of education. When we talk about barriers, we have to educate architects, and we must change curriculum in schools to provide for the youngster, not only in terms of mainstreaming, but in terms of greater understanding of what disabilities are all about. Through greater understanding, perhaps, will become a greater acceptance.

I think the things that effect me most, and I am very forunate, I really am, I have a good income, a very good job, and I hope in terms of my life I've contributed something, in NTID; in this program in Washington; but things that

that really effect me are letters to the President where a young boy will write and talk about his retarded brother. He'll tell how it's causing such a financial drain on the family, and emotional drain. With a 14 year old boy expressing those kinds of concerns, that the conference will do something for the boy. In terms of a young girl, right here in Rochester. She is 20 years old. She has cerebal palsy. She is a beautiful young girl, with long hair, but she has no physical control over her body. Her speech is very halted, at times when she is eating she falls and has to be propped back up. Her only comment, what she really wants out of life is, don't let them shut me away, don't let them put me in a home where I won't be able to use my mind and contribute.

Then we look over the lives of 35 million physically and mentally handicapped people. We've got to think of human beings, how to touch the heart and life of another person. How to make them part of this great nation of ours. How to make them feel as contributors.

As I said, I hope you will take the challenge of getting involved with the White House Conference, and I hope that in terms of your own educational experiences, that you will think of new ways to involve the handicapped, and I guarantee you it will be in the country's interest.

"PRODUCTIVITY - PHOTO OPTICAL TRAINING AND EDUCATION"

Martin Dvorin
Assistant Dean, Division
of Engineering Technologies - Monroe Community
College, Rochester, N.Y.

A. INTRODUCTION TO PROGRAM AND FIELD

An important but unique set of technical skills is being taught in the town of Brighton, three and one-half miles south of here. For the past several years Monroe Community College, part of the University of the State of New York, has been pioneering in a two-year curriculum in Optical Engineering Technology, which grants the degree of Associate in Applied Science.

The program is closely geared to the employment needs of the optical industries centered in the Rochester area. Although graduates are in demand and have found careers from the East coast to California, most are employed in many nearby companies, having entered as aides, technicians or first-line supervisors in areas of research and development, quality control and testing, manufacturing engineering or production, instrument design and sales and service.

I recognize that I do not need to explain what Optical Engineering Technology is to an enlightened group of technical educators such as this. But, in the event that a layman has sneaked in off the street, we do not teach the making and dispensing of eyeglasses. What we do teach is a multiplicity of disciplines employed in instrumentation of wide variety, but which has one common thread: light, or radiated energy, is necessary to the operation of all instruments and systems.

B. HISTORY OF OPTICAL TECHNOLOGY UNTIL THE 1960'S

Since ancient times, optics has been the playground of theoretical and experimental science. Many of the techniques used

in the manufacture of optics were the results of efforts undertaken in the era of such giants as Galileo and Newton. Unfortunately, while theory advanced, these procedures remained for the most part unchanged. Also unfortunately, it took two World Wars and numerous other similar actions to demonstrate the inadequacy of the technological and manufacturing side of optics. A circumstance which conspired to hold back progress in the development of fabrication processes was the fact that for the most part optical instruments and devices were autonomous and required very little in the way of a multidiscipline approach, so there was neither necessity nor opportunity for technological cross-fertilization to occur.

By the 1950's, electronics had been mated to optics in a number of applications. In the 1960's, a tidal wave of change took over. Large computers, using automatic design programs, reduced to weeks, days, perhaps hours projects that had previously occupied lifetime careers of optical designers and scientists. "Perfect" lenses, covering large image formats, were a production reality rather than a theoretical ideal. Lasers and other high powered radiation sources and dynamic, rather than static, components and subsystems imposed new requirements on the design, manufacture, quality and maintenance of optical systems; and "systems" became the keyword. The complete system needed to be designed and planned as a total unit, right through all production processes.

C. NEW REQUIREMENTS ON PERSONNEL CAUSED BY THE CHANGING FIELD OF OPTICS

The fabrication of instrumental optics has traditionally been among the highest levels of manual art, requiring sub-microinch tolerances long before manufacturing processes in other fields were dealing with ten-thousandths. Personnel were true artisans,

painstakingly trained, often on a one-for-one basis, by older, more experienced opticians (those who actually produced the optical elements) and instrument makers. Technical capability resided in a small group of scientists, generally former college teachers, who gave sketches of an instrument to a master mechanic. A prototype was built and duplicates copied from this. When the master mechanic retired or died so often did the instrument design.

New generations of sophisticated instrument systems imposed radical changes on the processes and, more to the point, on the personnel who had to produce them. Understanding of optics was required not only in the ray, but also the wave and quantum theory of light. Advanced test techniques and associated disciplines, such as electronics, photographic physics and chemistry and a host of others, were now employed almost as a matter of routine.

Coincidentally, a large percentage of craftsmen working in local industry, many of whom had immigrated to the political haven of the United States in the thirties and forties, would soon be due to retire, auguring severe personnel problems. A new "breed" of technician to replace them was urgently needed.

D. EMERGENCE OF THE OPTICAL SYSTEMS TECHNICIAN - START OF THE MCC PROGRAM

Things were also happening on a nationwide basis. During the early 1960's the Optical Society of America, the professional organization for the industry, initiated what was called "Optics - An Action Program." A task force was assembled to identify short and long-range needs of the optical industrial community. One of the results of the research was the recognition of the need for optical technicians-personnel who could function effectively at a level somewhere between the mechanic and the holder of a Bachelor of Science degree. The old "common sense" approach needed to be bolstered up with some

rigorous theory at a practical level. The community college seemed mated to the task, and a natural place to start was in Rochester, a major center of the optics world. (It is interesting to note that photographic equipment ranked fourth category in the number of new products introduced in 1975, according to a recent study released by the New York Stock Exchange.)

E. THE EMPLOYMENT AND SKILLS SURVEY OF THE ROCHESTER AREA

In cooperation with an industrial advisory committee, Monroe Community College began the Optical Technology program in 1963. (The name was later changed to Optical Engineering Technology.) This writer appeared on the scene as an adjunct in the fall of 1966, and then in 1968 on a full-time basis as chairman of the department. Although the program appeared comprehensive, an emergency meeting with a local employer who had expressed some areas of dissatisfaction indicated that perhaps another look at course content and curriculum direction was in order.

The author initiated an industry employment survey in which most of the local companies were queried for information which included, among other things, skills requirements of future graduates. Necessary changes were made. Constant feedback has occurred ever since, from ~~former~~ graduates as well as from representatives of the optics community. This feedback has proven vital, for, in the time the Optical Engineering Technology program has been in existence at Monroe Community College, there has been a succession of major changes in the methods of the industry.

Fabrication techniques requiring the use of improved machinery, of higher speeds, with more flexible and sophisticated controls have required a deeper understanding of mechanisms. New generations of test equipment have made commonplace phenomena considered esoteric

curiosities just a few years ago. And to it all has been added data analysis and processing using modern techniques.

F. PHILOSOPHIES OF THE OPTICAL ENGINEERING TECHNOLOGY PROGRAM AT MCC

Certain basic underlying philosophies have guided me in my relationships with students and curricula. One is - "don't just teach them technology - help them become technicians." Being an optical technician involves an attitude, which we try to promote during the student's stay at MCC.

The program is comprehensive, and the topics span the wide range of disciplines the student may encounter, with emphasis on each, hopefully, in proportion to the amount of activity, in the field, of that topic. Although sloppy theoretical approaches are not tolerated, the methodology of doing the job, equipment selection, work habits, use of good techniques, data acquisition and understandable communication of results enjoys higher priority than an in-depth knowledge of all the theories involved. The goal is for the graduate to be a self-starter, to be able to do a complete job with a minimum of supervision. It is this author's observation that while the curriculum certainly must teach correct principles and employ up-to-date technology, the development of proper "feeling" toward the work is paramount to achieving success in optics. The equipment and subject matter are merely vehicles which are used in the interpersonal exchanges which occur between the instructor and the student. The results of this very subjective effort are usually not evident for some years after the student and the instructor have completed their assigned tasks with each other. It is still true that, for every employee who fails because of technical incompetence, perhaps four are let go because of personal unsuitability to their job situations.

G. CURRENT CONTENT OF THE PROGRAM

But a successful employment applicant must still have the technical know-how to handle the job competently, and a look at the curriculum content is in order. Every course in the program introduces the student to a new phase of optics and deals with the terminology, concepts and practical skills requirements associated with that phase. The goal of each laboratory experiment is to introduce the student to a new piece of equipment and a new technique as well as to a new concept. Throughout the curriculum, the "systems" concept - the radiation source, the optical elements and the detector - is kept in mind.

In the first year the student is made familiar with the use of light rays in relation to optical components and instruments, while at the same time learning basic techniques for setting up and using the equipment, and data gathering and reduction, employing some statistical concepts when indicated. The student performs testing procedures such as might be encountered in a quality assurance function and learns of the structure, capabilities and limitations of various optical instruments including human eyes, telescopes, microscopes, photographic and metrological systems. The program is so designed that there is a natural "break" point at the end of the first year, giving the student a body of knowledge and a set of skills which make him employable at that time. Indeed, some students opt to take jobs after one year of full-time schooling, continuing on a part-time basis to complete the program in a total of three years while gaining two years' experience.

In the third semester, the student is introduced to the use of the wave concept in optics, while practicing more demanding and

precise techniques for handling the more delicate equipment and instrumentation necessary. In the fabrication laboratory the student also learns those processes unique to the working of materials for the production of high precision optical elements, as well as good shop practices. Each student keeps a notebook and time records, beginning what we hope is a career of cost awareness and feeling for productivity. Processes include vacuum coating and deposition techniques, these becoming of ever-increasing importance.

In the fourth semester, the student works with systems employing detectors other than the eye, namely the photographic process, so important to the region around Rochester, and electronic detectors along with associated signal processing equipment. More detailed studies are made of representative radiation sources, including natural, thermal, atomic and modern ones such as L.E.D.'s and lasers. The student gains proficiency in using a variety of photographic equipment and processes for technical and scientific purposes. Testing of various components, as well as the photographic system as a whole, is stressed.

The philosophy is not to depict any one device, process or technique as "generally" superior, but to permit the student to make decisions when setting up systems which will result in a better selection of components and equipment, doing intelligent, theoretically correct improvisation when necessary.

H. MATCHING CAREER GOALS WITH STUDENT POTENTIALS

The motto of the State University of New York is, "Let Each Become All He is Capable of Being." This motto is taken seriously in the Optical Technology Department. We therefore have a rather heterogeneous student population comprising a full range of capabilities from students who barely "squeak through" to those who need no

instructional assistance - they do fine by themselves.

As a result, we are able to direct and place students into a wide spectrum of job opportunities, from manufacturing to high technology research and development. Student advisement is and should be an ongoing process (sometimes even after the student has graduated). Unfortunately, it often degenerates into a credit-counting session, wherein much juggling is done so that the student may fill a schedule and graduate.

One device we use is a guided interview with each student at least once a semester, during which we review and update the students' experiences, aptitudes and aspirations. We feel that a major reason for the history of successful placement of students is the effort made to assist the student in getting into a job best suited to his or her personality and aptitudes.

For various reasons, students have worked while enrolled in the Optical Engineering Technology program. Generally it boils down to economics - the student needs money, and working provides funds to help pay for schooling or living expenses. We continually seek meaningful work experience for students, especially during the summer months. (Some summers are better than others - lately we have been looking wistfully back -- or ahead, optimistically, to better summers.)

Work experience which relates to the student's education and career goals is, of course, valuable in supplementing classroom activity. On the part of the school, it is uneconomical to schedule much more class laboratory time than is necessary to introduce techniques to the student and provide entry level skills. More scheduled hours often turn an experiment into an exercise. The best place to acquire extensive job training is still on the job. We had some experience with work-study programs about ten years ago. Students worked

approximately twenty hours a week while at the same time taking about thirteen credit hours a semester. The concept was that at the end of three years the student would graduate with an A.A.S. degree and three years of experience.

The rate of successful completion was low. Of almost 150 in the field through studying with us, there are very few people employed in the optical community as a result of these "split week" programs. One reason was that, by splitting up the work week, the student would not be given meaningful assignments on the job and many times reported "busy work" being given at the company. Naturally, the classwork had little relevance, if any. Those projects died for lack of life.

J. THE KODAK APPRENTICE PROGRAM - AN INTRODUCTION

In the summer of 1971, we were visited by a number of managers from the Kodak Apparatus Division of the Eastman Kodak Company. They had a plan for a program, in which selected employees would receive on-the-job training at the Hawkeye Works, the optics manufacturing arm of K.A.D., while at the same time receiving classroom education in the Optical Engineering Technology program at M.C.C. Evidently, they were satisfied with what they saw and heard, because the program was approved. Mr. Jim Freeland of Hawkeye will be telling more of what was happening "meanwhile, back at the company."

M. Dvorin, M.C.C.

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"PRODUCTIVITY - AGRIBUSINESS"

Dr. Thomas Leamer, Chairman,
Plant Science Department
State University of New York, Ag & Tech at Cobleskill

Introduction

The subject for today is rather broad and one might choose to approach it many different ways. The term "agri-business" is about as broad and misunderstood as is the term "conservation". I like to think of agri-business as all of those businesses providing inputs producing, processing and distributing agricultural products. However, I find it very difficult to separate production agriculture from agri-business. Therefore, throughout this presentation, I will treat both agri-business and production agriculture.

For every individual employed in the business of agricultural production there are four or five others in agri-business. The processing, distribution and sales of agricultural products is a very complex business. Farm businesses are dependent upon many other people with training and appreciation for the business of agriculture.

The production of food and fiber has evolved from a primarily self-sufficient production agriculture to a highly mechanized and specialized industry requiring increasing input and output services. Today's farmer may have his cows bred by a technician, his soils tested in a laboratory and his business records analyzed by a computer. Today's complex urbanized agriculture has replaced the self-sufficient farmer of many years ago. Then each family produced its own seeds, bred its own stock and provided

most of the other raw materials needed for farming. Today processing and distribution of farm products may involve processing of a single product into several forms for consumers. Controlled storage facilities now make possible year 'round availability of seasonal products. Consumer demand for conveniently packaged and ready-to-serve foods has further increased the need for processing and distribution services.

Research, education, mechanization and the growth of non-farm markets have changed the face of agriculture. Agricultural research came fast on the heels of the earliest farm machines and by the end of the 19th century the scientists at the land grant universities and the state and United States departments of agriculture were examining problems in soil fertility, plant breeding and the improvement of livestock. Their discoveries helped increase the productivity of each acre of land and each head of livestock.

Simultaneously, a growing number of people who lived in cities or worked at non-farm jobs in the country had to be fed. Handling storage and processing methods were improved so that food could be moved farther and stored longer. All of this productivity comes under the umbrella of agri-business.

The increasing technology of agri-business requires a corresponding increase in the training level of agri-business workers. At the same time, the rapidly growing array of businesses and industries providing supply, processing and distribution services to agricultural production requires trained workers to be available in increasing numbers.

Productivity in Agriculture

For the agricultural industry these are times of unprecedented change. I believe the changes are significant and deep-seated and that they will continue into the 80's and make a lasting input on America. There is no doubt in my mind that those involved in technical education in agriculture are currently, and will continue to be, catalysts and motivators of these

changes.

I believe that when we discuss productivity in agriculture we must direct our attention to food production. As I progress through this presentation, I hope that we can relate productivity in agriculture and agri-business and the implication of each on the productivity in technical education.

For many years we have soared higher and higher -- physically and intellectually -- we even have our flag on the moon. However, in the past decade, we have begun to realize that we are all in reality earth animals utterly dependent on the mineral rocks, organic matter, other animals, birds, fish, fresh water and other natural resources. Yes, we can soar but must rely on the land and soil for our food. Thanks to agricultural technology, famine is not currently one of the problems in the United States as it is in some other countries. In fact our agricultural technology has turned our nation -- the world's most industrialized -- into the bread basket of the world. In 1974 we supplied 44% of the world's wheat exports, 70% of the corn exports and 86% of the world's soybeans.

Agriculture accounts for nearly 1/6 of the United States gross national product. In New York State (a state boked at by many outsiders as a state of commerce and industry) agriculture is a six billion dollar industry. It is the state's largest and most important industry. In New York total production today is 30% more than the state's farm production in 1900. Yet there are only 1/5 as many farmers and they work less than half as much land.

Nationally, one of five jobs in the United States is in agriculture or related to it. Agriculture is the nation's largest industry employing 4.4 million persons directly and supporting another 10 to 14 million jobs in machinery, chemical and other industries and in processing and marketing food and fiber. The value of the United States farm assets exceeds 485 billion dollars and debts total about 80 billion dollars.

Increasingly, farmers depend upon others to do some jobs they once did themselves: spraying, fertilizing, equipment repairs, building and maintenance, just to name a few.

Indications are strong that agriculture will have to expand even more in the future. At the present, there are no major food surpluses. An ever-growing populations demand for better nutrition in the developing countries will require sizeable increases in world food supplies. As production agriculture expands, new supportive businesses also are added. The growing complexity of farm business and trends toward incorporation or partnership have brought attorneys into agriculture. Expansion of farms and processing plants has increased demands for credit. Substitution of packaged for bulk vegetables and fruit has brought in manufacture of plastic bags and other containers. The list could go on and on.

Technical Education in Agriculture

With the aforementioned information in mind; it is no wonder that at a time when college admissions are leveling off the enrollment in the agricultural technologies across the nation increased 10% annually in 1974 and 1975. Here in New York State we have one of the most comprehensive programs of agricultural education in America. There is the State Agriculture and Life Science College and Veterinary College at Cornell and the six unique Agricultural and Technical Colleges. The Agricultural and Technical Colleges offer a network of down-to-earth first-rate two-year colleges for modern agriculture technology.

There is no doubt that agricultural technology and science have made our nation the leading producer of food and fiber in the world. With this in mind, we need to continue and expand our programs to train technicians in agriculture. There is no question that it is necessary to prepare a more highly educated and technically competent individual to work in production

agriculture and the vast area of agri-business. Two-year post-high school agricultural technology programs have proved to be successful in providing and excellent education for the farm owner and agri-business personnel. These programs need to be maintained and increased with demand. The types of agricultural technology programs currently being offered are:

Livestock Production

Dairy Production

Horse Husbandry

Small Laboratory Animal

Verterinarian's Assistant

Crop Production

Soil and Water Conservation

Floriculture

Nursery Management

Turfgrass Management

Arboriculture

Agricultural Chemicals

Agricultural Mechanics

Food Processing

Grain, Feed, Seed and Farm Supply

Forestry

Fisheries and Wildlife

Park and Recreational Land Management

Societies reflect in large measure the degree of application of technology. In the United States we live in a society markedly different from any previous one -- largely because of the extent of the application of advanced technology. Certainly agricultural technology has had a great influence in this technological society.

According to the U. S. Office of Education, an individual who has had the opportunity to gain technical competence through formal education usually can arrive at a degree of productivity and responsibility in three to five years. Normally, this would have taken 12 to 15 years by past standards if he learned and picked up all of his education on the job by diligent work and study. This means a net gain of some ten years of high productivity benefiting both the individual and his employer as a direct result of the student having an opportunity to overcome his academic deficiencies and successfully prepare himself for higher level employment. Productivity benefits of this type are worth pursuing. The need for this kind of training is increasing tremendously and the technical educator in today's society is a key person. This is true for technical education in general and specifically for agriculture.

Generally speaking, I believe that technical or occupational education is a basic necessity for the general well being of an individual because a man who does not work is an economical,political and psychological drag on society. Therefore, I firmly believe that occupational education must be a fundamental of the total educational system for every individual.

Those of us in agricultural education have an opportunity and a commitment to provide the technical competencies needed to meet the productivity needs of agriculture and agri-business. I believe that we are in the best position to know what is needed in the future as far as quantity, variety and quality of programs are concerned.

We are increasingly being told that we must double our production in the next 18 to 20 years to keep up with population and economic trends. This type of increased productivity represents a real factor in an agricultural explosion yet to come and reflects a rapidly expanding need for highly skilled specialized and knowledgeable people in agriculture.

Production agriculture and agri-business are becoming more enticing to "get in to" rather than "get out of". Skilled technicians and professionals represent the hope and the need in agriculture in the years ahead. There will be little room for the unskilled and uneducated.

The Challenge

It appears that there will be increased emphasis, greater acceptance and programmatic expansion in all areas of vocational and technical education. It appears that there will be an expanding need for programs which provide specialized technical and related educational experiences for the growing number of people in our society who want more than a high school diploma.

There is a need to recognize and more adequately accommodate different cognitive styles in learning. We need to look at students previous experiences, their abilities and their learning styles. We still tend to put everyone through the same hoop often repeating what they may have learned previously.

As the agricultural industry continues its movement toward greater specialization, we need to be aware of this in our technical programs and alter our programs as the need arises. Also as the world continues to become more complex and specialized there will be increased emphasis on educating the whole person. This means that a meaningful proportion of the students' educational program must be in the general education areas of humanities, communications, social sciences, science, math and physical education. Students should be specialized enough to be knowledgeable but have enough breadth to be able to change as the specialization changes. We need to nurture an interest in life-long learning and an understanding of the society in which one lives.

Life-long learning is now receiving greater emphasis than ever before. If we in agricultural education are sensitive to this trend it will require

restructuring of our traditional programs. We will have to deviate from our traditional length programs of one, two or four years and perhaps offer blocks of courses for one, two or three weeks or whatever the length of time fits the particular needs. Perhaps we will even see a movement toward year 'round education in agriculture. This is already being done at some technical colleges. For example, the University of Minnesota Technical College at Waseca had 300 students enrolled in a technical agriculture program last summer. There is absolutely no doubt that many of the agricultural courses could best be taught in an outside laboratory during the summer months.

If we are to meet the productivity challenge in agriculture, we must have highly specialized facilities. We need to keep our facilities updated and change with the trends of agri-business. I believe one of the greatest mistakes we can make in technical education is to try to conduct a technical program without the proper facilities. An example of what I am talking about is the "geranium in the window" horticulture program. This type of program operating as technical education can be very damaging to all of us. At the conclusion of my presentation, I will show a few slides of the agricultural facilities at the Agricultural and Technical College in Cobleskill, New York.

Instructional Requirements

All of the items I have mentioned will have little chance of success if we don't have properly trained faculty and supportive staff. It is necessary that an individual have the background to match occupational specialties. Some degree of occupational or employment experience is desirable for faculty in a technical agriculture program. This work experience of course should relate directly to the technical subject matter that is to be taught and also should be recent enough to reflect current business

or industrial practice.

The most important quality for teaching faculty is perhaps the most difficult to assess. This quality is the desire and ability to work with, relate to and motivate students. A technically competent and experienced subject matter specialist without this quality is a liability to any instructional program.

Providing appropriate in service educational experiences that will help keep technical educators up-to-date is one of the most formidable and crucial problems facing all technical education including agriculture. Teachers must be kept current in their knowledge of scientific changes and the changes in the techniques, procedures, apparatus and equipment in their specialty within agriculture. It is important that the administration provide a plan by which teachers will develop proficiencies and remain technically current. This can be done by sabbatical leaves, through formal course work, attending workshops and conferences, participating in professional organizations, reading current literature and last, but certainly not least, a periodic return to industry in the field of their specialization.

Before I leave this area, I would like to share some general goals for technical education that were drawn up for the State of Kansas. Although they are general in nature, I believe they contain food for thought and certainly are applicable to technical education in agriculture. The goals are as follows:

1. To provide a pool of well-qualified personnel to serve the manpower needs of the state and nation.
2. To serve as a catalyst in shaping the future economic, cultural and social progress of the state and nation.
3. To provide education to fit the diverse needs of the people.
4. To foster excellence in teaching and research in the best possible facilities in order to provide quality technical education.

5. To encourage and facilitate life-long learning.

6. To utilize the resources and expertise of technical education to the fullest in order to most effectively serve the needs of the people.

Summary

In planning the future for training technicians in agriculture, we need to reflect on the past and observe the realities of the present. The future does not all of a sudden appear but instead emerges gradually. Robert Warmbrod of Ohio State offered the following idea in a recent article. "One strategy worthy of consideration by those who want to shape the future of agricultural education is to elicit from the past those factors that have contributed to the success of agricultural education then extend and modify these principles in light of present realities and the best evidence available of what the future holds."

Occupations in agriculture will increase in kind and numbers in the years ahead. Agricultural education at all levels will need to keep alert to emerging changes and needs if we are to meet productivity needs in production agriculture and agri-business.

It has been a pleasure for me to meet with you and share some ideas on agricultural education. To conclude my presentation, I would like to show a few slides of the agricultural facilities at the Agricultural and Technical College at Cobleskill, New York.

"PRODUCTIVITY - FOOD SERVICE"

Fred Samson, New York State Restaurant Association
New York, New York

I think that our industry is most likely one of the most misunderstood. There is probably less authentic information about it than any other major industry in the United States. The gentleman said a $65,000,000,000 industry, which is pretty close to the mark and we anticipate within the next three years that we probably will cross the $100,000,000,000 mark. The growth of the industry has been that great. I think more importantly is the fact that the industry's growth has been, for the last two years, outstripping inflation so that we're talking in terms of real growth. And where there is real growth, obviously there is real opportunities, which we feel are abundant in the food service industry. For example, in the State of New York last year, our sales represented about 12% of the national market. Recognize that of the 90% of the food service outlets in the United States, 90% do less than $250,000 a year. So you are really talking about a very small percentage of restaurants doing a lot for the business in the State of New York. The only industry that exceeds our industry is the conglomerate of the retail industry: taking the entire retail industry as one, they do employ more people that we do. I think it's also interesting to note that by the very nature of our business, increasing productivity is the greatest challenge we face.

Fifty years ago, it took one waitress to wait on 20 people at a banquet or at any given restaurant. Fifty years later, today, it still takes one waitress to serve 20 people at a banquet or restaurant. Productivity income per employee is practically low man on the totem pole. I believe that the United States Steel Company figured their employee productivity at somewhere around $300,000 to

$350,000, an astronomical figure, I'm not quite sure of. But, in reading a report by Fortune Magazine of the top 30 industries in the country, the food service industry was about 27th with an annual productivity of about $11,000 per employee. Each employee producing about $11,000. When you measure against the super market industry, for example, you find that we are faced with this problem, but there's a reason for it. It is a very personal type business. Eating out is not only a biological necessity, but we think of it as a psychological one. Most people, for example, my wife, thoroughly enjoy eating out, for various reasons. Number one, it gets her out of the house; two, she's not faced with doing dishes, or with preparing food, she just sits down and someone waits on her. The time element it takes for us to be served in a restaurant to produce the income to the restaurant is far greater, period of time than you would find in most other businesses. Most people go through the supermarket and we allot 33 minutes (in the last survey of the Supermarket Institute) to produce a sale of $60, $70, or $80. Two people go into a restaurant and it can take an hour and a half to produce a sale of $15 or $18. When you measure these economic factors with food service industry as to other industries, I think you start to see what's happening. I guess one of the good aspects or good features of that whole economic situation is that we still use people. There is no restaurant, that I know of, in the United States that leans on computers to any extent, other than to handle payroll. There are no 'automated' restaurants in the United States, as we think of the word automation, because it still takes people. And therein lies the tale and the needs of this industry.

The National Restaurant Association, in it's last statistical data, suggested that the industry needs a minimum 225,000 people per year. Those of you who have had an opportunity to take a look at what's happening in food service, would agree it is a fair statement when I say that there is an explosion in food service

education at the two and four year college level, as well as in the high schools. We get more and more reports of high schools where young men are taking Home Economics in preparation if they are going to a two or four year school, because the high school doesn't provide any food service training and this is the only place that they are going to get any kind of information.

During our economic slow down, if you were to look at the Sunday want ad, classified section of the New York Times, (which I think is really a barometer of what's happening across the country) there was an obvious shrinkage in the number of ads for computer specialists, engineers, designers, and all these other jobs. During this period there was an expansion of job needs in food service, both in what we call restaurant and food service operations. Restaurants fall into the catagory of public feeding, while food service "management" covers the whole spectrum...school feeding, in-plant feeding, hospital feeding, that aspect of the industry. So the opportunities are quite dramatic and just popping up all over the place. I think the thing that surprises people is the wage rates for properly trained people in our industry. We're talking in terms of entry wages in second year management levels of maybe $11,000 to $13,000. There are chains that can't expand quickly enough because they can't find the people, and the opportunities are unlimited.

The other thing that's happening in the food service industry is that it does offer the opportunity to be an entrepreneur, to be your own boss, to really operate your own business. As you look around our industry today you will see the leadership, the people who are producing, the people who's success stories are becoming nationally known and, basically a younger element, than in most industries.

Unfortunately, we do get into a situation where we have high turnover, but most of our turnover is internal. Very few people who are in the food service industry, while they may go from job to job, actually leave the food service industry. It is usually a migration from restaurant A to operating B to operating C.

And as a result, this again has created management problems. When you get into a turnover situation, you have a dramatic effect on productivity and the possibilities of producing the kind of progress that you want. My observation is, if there is one thing that is greatly needed in almost any type of business training program, no matter how formal it might be. That one thing that must be put into the minds of the people we're training, is the desperate need for customer relations, of treating people like a customer. There are possibly fifty restaurants that someone goes by to select a restaurant. When they do select a restaurant, they select it for a reason. That selectivity can be a disaster if the relationship between the customer and the employee is violated. I don't know of any industry where that is as pronounced as it is in the food service industry. Again, in our surveys we find that the leack of training from management to the employee is at times, because there is a lack of training for that manager while he is in school, while he is being trained in the need for customer relations. I must say that is the weak point of our industry. It is because we are such a person-orientated industry. You can go into the finest restaurant and if the waitress is friendly, if she treats you as though you are the only customer she has, the food can be mediocre and the price can be high, but you still had a pleasant evening.

I think that the future of the food industry is one of the real bright spots in our profession. And if I were advising young people today, I would very honestly and very sincerely advise that they take a look at a career in food service. The rewards are great, the opportunities are endless, and I think there will be a great sense of self-satisfaction. I can only stress again the human element.

"PRODUCTIVITY - FOOD SERVICE"

Carl Arena, Burgandy Catering
Pittsford, New York

In the past year I have had the opportunity to converse with students who have made a decision for their future in this field. It is refreshing to know students, especially in community and two year colleges, are there for the fact that they have chosen a field they like. Most of the students have passed the stage of "I don't know what I want to do. I would really like to find what I really like and I may take a year off between high school and college to find out, after all I don't want to work as hard as my parents did. I will be working the rest of my life. I want to get my head together. And I'm in the food service course because other programs are full."

The present economy has brought out the fact that the technical student will survive and advance in our field. Students are no longer in school to dodge the draft or mark time. I spent over five years in a community college where a waste of energy and talent was very evident. Students and returning veterans were not in an education climate to learn. I am very happy to know that you and students throughout this system are eager to pursue a technical career education in the hospitality area.

Fred Samson just mentioned the fact that it's an industry where students can move up and readily get into their own business, which has a lot of self-satisfaction. But there's also the opportunities to be very successful, with the education system we have today, especially in continuing education. Any good bartender, chef or hostess has the opportunity for success.

I can remember the time, and it's not long ago, that I went to a meeting of chefs, area food service managers. Someone remarked,"do you know that the new manager at Oak Hill Country Club is a college graduate, and he's from Cornell

no less". This is less than 20 years ago! Today it is in reverse, "do you know the new manager at the Top of the Plaza does not have a degree?" Education is in. All establishments, from fast-foods, to the swank country club or hotel is looking for young, aggresive, educated people. For we are also in an industry that advancement is very rapid. Sometimes, we have 25% or 30% of the field beat by just being on the job every day and looking neat. There isn't too many industries that can offer that. Next you have to produce, of course, and the productivity comes in. After that it is easy to go to the top with a little knowledge, hard work and continuing education. There certainly is the opportunity.

Technical career students can name their own tickets. However, before they purchase this ticket, you can advise them to look in the mirror and decide what they want out of this. But students should ask, "can I work Sundays, holidays, weekends, New Years Eve?" With a planned career and education the students now has the opportunity to choose. Country clubs, restaurants are exciting and challenging. Living in a hotel and traveling the world for an Americana or Holiday Inn chain is romance at its best, but can your wife or husband go along with it? Working New Years Eve: the waiter must know that he's there to see that his guests are enjoying the party. He can't join the party. Can the chef take a call at 12 midnight if the night cook or bakery did not show up? What am I trying to tell you?

We have become specialists in this field, no different than in any other industry. The student is faced with the decision in specializing, in a club, industrial feeding, fast-foods, or school lunch and college feeding, etc. Are these opportunities in technical education in our field? What's wrong with a chef earning from $12,000 to $35,000 a year? A waitress earning $200 per week just working lunch in a good house? A salad girl at $3.50 an hour starting wage? Breakfast cooks at $2.25 an hour, entry level jobs?

Every one of these positions, with on-the-job training and continuing education, can lead to middle-and upper-management levels. I urge you educators to be conscious of the future. We are no longer an industry made up of people on the move. Waiters and waitresses don't move with the seasons anymore, north to south. Cooks don't come into the city from New York, or the larger metropolitan districts, work here six months and move on. Most of the chefs, stewards and kitchen managers live in the area, own a home, have two cars and are very, very stable people. I'm sure this is true in other areas. I see many changes in this industry, from the individual owner outlet to the national chain corporation. We are all aware to maintain good employees, company benefits and fringes are important. Right down to the smallest restaurants, we are all becoming aware of the fringes of hospitalization, life insurance policies and some kind of pension plans. So we are trying to keep up with industry. As for food service education in the Rochester area, I think we are unique and fortunate. The area offers food service from high school level, BOCE center, Monroe Community College, which offers a two year food administration program, and Rochester Institute of Technology with a four year food and motel course.

"PRODUCTIVITY - FOOD SERVICE"

David Geller, Instruction Coordinator
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I'm going to cover what we do to meet the needs of food service, which will possibly serve as a guide to some of you in setting up goals in what our students call a dynamite field. As Mr. Samson said, this is the industry that you go to college for, you train, and there are jobs waiting when you leave, as he said, there are approximately 200,000 jobs. We find now at our school large companies are interviewing students and we find honestly and truly that we cannot meet the needs of industry. One of the tremendous needs within the food industry, is in the preparation area. What they need are chefs, with supervisory techniques. Most food service in this country is steaks and chops, the steak house. Fine foods, such as in France, is difficult to get, because it's difficult to get a good chef on a continuing basis. Our many companies are training our graduates, taking them and developing fine food services.

As for productivity in food service! What do you do in relation to productivity? How do you make someone productive? How do you get the end result? Basically you have to set up goals. We try, in our educational system, to set up the same goals as those that are making progress in industry. We are attempting to, and have been successful at, preparing a graduate who goes out with his wheels spinning.

This is just a small quote: "The training and personal qualifications for a job in the restaurant and food service industries vary, depending upon the level at which you want to work". If your personal goals and ambitions can

be satisified with a job as bus boy, janitor, or dishwasher, we need those people. The formal education and training need only be slight. If your ambitions and goals extend to management responsibiities, then you must plan on acquiring more education and training. It is up to us, it is our obligation in industry and in education, to provide this education. This is what we are doing at the Cullinary Institute. We're providing this education for greater ambitions...broad executive responsibility. The amount of education required, corresponds with the demands of other industries. We are developing professionals.

Food service people are no longer domestics. Maybe the government and the connotation of food service people call them domestics, they are professionals and we are psyching our students up to that degree. You are professionals. We are pulling them out of the corners. We are taking students with potential. We are working on them. In fact I've hired a psychologist who worked through dynamics teaching people basic human relations, how to get together. How to work with and for a supervisor, so that when you get our into the world you know you are in a voice of atmosphere and educational community where everyone isn't 'momma' and 'poppa'. Can we prepare them for that? So in no way do they leave the job, you know the chef every 6 months throws his apron down and quits. We're trying to make professionals that stay on a long range basis and the education benefiting the particular firm.

The after scene is obvious. The more education and specialized training you have the better your chances for progression and higher learning. This is now coming true. We are pumping education into the spongey gray matter. We are giving the students practical experience, and more importantly, something that many haven't done in this country for years! We are teaching how

to manufacture the product...not just control it as most of your institutes of higher learning have been doing, say in this state and the managers, supervisor ending up at the mercy of the chef. We are teaching them how to manufacture the product, then they can control it, control all aspects. And in this process, this is basically how we start. This is the product. We're no different, you know, we're no different than any other industry. This is the product, the base product. That is supposed to be red on top. This is what, and I think that he has designed a ham and egg platter, he has designed a bouillon base platter, a grilled cheese, this is your base product, such as in the auto industry, you have a base product.

Now you design this product, and from point you have a prototype. In our industry getting from prototype to the production on a continuing basis is the most difficult part. You have firms that have commissaries. One chef produces 100,000 items, say lasagna. It's consistant because it's produced by one man along the standards of a commissary and the lab. It goes into a freezer and all they do with hundreds of units throughout the country is open it and the customer likes that, it's a standard. A lot of your franchised chains maintain standards and the customers agree its good.

Now a lot of us go to many restaurants and from the production model that's been designed and the product they receive, this is what happens. And this, is you have a manager, a supervisor, or any food service, if he knows how to manufacture the product, he can acheive the direct, he can go back and acheive this on a continuing basis. If you want productivity you just don't talk about quantity, you talk about quality. This is what we get on a continuing basis, various size, shapes, forms, tastes, service, everything else. And this is our education in producing productivity, introducing end results we produce quality productivity.

Now the hardest aspect again is a repeat from production of prototype. Getting the designed item that we taste and test, that we market survey that we know that the customer will want. Now when the customer comes back to any particular restaurant, this happens all over, it's not the same. It's different. BOOM. He goes and we find that in doing surveys when a customer initially sits down and goes to bite into that product his memory banks lock in whether it's good or bad. And that's what remains in the memory, not when he finishes the product. When he's through eating he doesn't remember. Another point that we have to educate to get quality productivity is from the stove to the table, the prototype, the production model. Whatever the time lag is, and into that aspect we have to train people in sanitation holding, and the growth of bacteria. Many of you here have gone out to eat and come home a little distressed in the stomach and say maybe I'm getting too old, I shouldn't eat it. More often than not, it was probably contamination. The rules of proper sanitation and food holding weren't held. Also taste and keep can be destroyed in improper transfer, from one aspect to the next. We're talking productivity, productivity, but in our business in food service we have forgotten that we are a manufacturing industry. We have not trained to produce from stove to table. Whatever it takes, whatever magic it takes we have to train. Whatever time lag, it should have that taste and also from prototype to production on a continuing basis.

Now is our education. In our education in industry we have to keep it working for us. Also we hire people, lot of us don't have job descriptions, we just hire. If you worked for restaurant XYZ, you were a broil man for 20 years, or you did this, come join us. You'll do it. You'll produce. And we use somewhat of a simple hourly appraisal form. I've only shown this to point out in this area, productivity. This is all it's ever been. Amount of employee output. That's all they've considered. The amount of output,

tonage. At McDonald's, how many hamburgers an hour or any other greasy spoon, or anyplace. Now that's an excellent operation when it comes to controls And the productivity this is all it's meant. No professionalism. Tonage, non of the aspects of production models, prototypes or anything else. We've gone into this for our Cornell graduates, our Michigan graduates. We've gotten a little more sophisticated and we have developed these type of forms. I'll take them a step at a time.

The hourly appraisal form has been for our standard worker. We've judged them only on those standards. We have not upgraded them, we have not structured our industry to support something professional. Knowledge of work, viable work quality, personality, needs improvement. We've been afraid of the professional people to structure our industry because the big cry was professionals doing a good job will want more money. We've forgotten that with professionals we structure a business, that is we structure education with professionals that is directly proportional to increased sales. With increased sales your bottome line, whatever, there are our salaries to pay. With staffing we are providing this education. The type of people who will meet this type of appraisal form to structure a food service are educating with those goals in mind...to get productivity. You cannot get productivity with quality from a rock.

Another aspect, analytical ability. Why can't a dishwasher have analytical ability? It might sound strange. When it comes to dishwashing, you bang two dishes together, your careless, ten days later the crack appears, and they blame the poor guy that's running the machine. Or if he's not watching the guages, doesn't know anything about sanitation, doesn't know about 180 degree. You have a flu epidemic in your local and you wonder why customers are not coming in. Whatever. Or if you're in a college food service you wipe out the college food service, whatever.

Mental alertness, initiative. We have none. We have only treated our management people. We have not treated the overall food service.

Not to delay the most important aspect. Leadership. Training leaders in food service, knowing all aspects, this is what we are doing in our schools. Our goal is to train leaders. If they don't have the ability, not born with it, we help them aquire it. And leadership is the ability inspiring all of us, the willingness and desire toward a given objective a successful food service. Give them the ability. If they have difficulty, we help them. Those who get the results without friction, are those who will be an inspiring and effective leader. All aspects of it.

If we are operating a food service, or operating a school saying we want to become involved, alright this is technical education. It's not just a computer. It's not just an electronic brain. There is technical education involved in food service. Now in a school we have to plan our goals. We want to train professionals. We look realistically at BLANK in our school. What will industry require today, more importantly, what will industry require tomorrow. What do we train. We look at those. We have to develop programs, which we have so that the student is more productive. The student is involved in the structuring of programs. We make him a self, he is capable himself. We're not worried about tying him to one particular firm. He himself gathers an ability where he is an asset to a firm, whatever food service he goes to. And they do recognize this, they have had the experience with graduates. They recognize this ability in time.

In our development at school, we have developed a new theory, no longer the front of the house and the back of the house. The need came about because we had students coming in saying, gee I just want to cook, or I don't know anything about accounting, I don't know anything about cost control, and they went to the back of the house.

Chastwood can supervise people and they are willing to pay for it. So we feel we have developed this, we have a front of the house, a middle and a back of the house, and there are thousands of jobs in all aspects. The middle being the overall control, we train into that. You wanted the back, just cook, fine. Cook with control, work with personnel, whatever. You want to be in the front of the house, we're into service. We have a table service department. All aspects of fine table service, and I don't think there is anyone here that doesn't appreciate fine service at the table when you go out to dine. We have table side dining, flaming, everything, but the waiters jacket and it goes over very well. Our wine servie, tremendous in the industry. I understand statistically there was a gallop poll that most restaurants of all of the potential, they only meet about 25% of the customers with wine sales and wine sales are tremendous. We all push the booze you know, the 7 and 7 or something else, or cocktail. There is a lot of money in wine and industry knows it. And we are training our students who go, want to train as a maitre d' how to sell wine, all the aspects of wine. We have wine tasting. These students learn, they go out into industry, they're an asset as a maitre d', even a young kid going out, a 19 year old kid, would be far better than most experienced waiters that you possibly pick up in the large cities. They boost, they train, I use the word boost, that's an old sales meaning, they trade up and wine is sold, and we are training in that aspect.

Now in productivity, we do consider the individual's ability to produce is a conditioned reaction. The reaction and the ability to produce on a continuing consistant basis is done by a machine. But we have to train our students to be, have an objective, to have a goal to produce properly and we have to provide a training process. A lot of areas in our food service industry do not provide training for this purpose, of developing an ability, of developing coordination.

For instance any of us who first started learned to drive a standard transmission, going down on the break, the clutch, the gear shift, the horn, you had to be aware of everything and after a while that coordination develops and you could drive and accomplish more. You could even have become a racing driver which you didn't think you could be at the beginning because of the coordination. And this is what we are doing, this is what all educators should do in food service. Develop this coordination, give the student the ability to function and work.

We're developing an externship program. While attending school they'll go out and work in industry. They will develop this ability of coordination in a training process, and part of that training process has to be a hands on process on a continuing basis.

Trainees have to given the opportunity to practice their newly acquired skills. And this is the hard part, to a degree. If you haven't had heavy experience, sometimes you're not hireable. But we feel that a lot of our graduates with skills are, and we have proven success with it, have abilities that will help the particular food service achieve their goals.

Now, we have a phase in our education, we have a definite course. But in our management course, let me just depict what we do. After they have learned to manufacture the product we teach them how to control it and we have a definte program. We make them as capable as any supervisor or manager in the country. I'll challenge any other school in the country, but they've learned how to manage, and we teach them the industry needs for controlling the product. We have a program that makes them aware of everything, I don't know if you remember years back we had the Manhattan project. When they developed the atomic bomb each division put together a different aspect and they didn't know what the other division was doing and one person tied it all together. In our food service we operate the same way. The dishwasher doesn't know what's

going, this one doesn't know what's going on. They don't know the goals, they don't care if they drop a plate, or this gets burnt, they don't care that the waiter has to face the customer with a burnt item or the owner who has to register sales or somebody gets sick. We coordinate. We have them go through every phase, respect, and appreciate what the next one has to do.

In our management program, after they learn how to manufacture the product, we ease into the course control. We make it very simple. We don't go heavy on balance sheets or anything like that. We call it operational accounting. The first thing we teach them is how to develop a budget, a format a crystal ball for the future. You can develop a crystal ball. It's very easy and know what your sales, your financial goals are for the year. We show them how. We slip it to them slowly and they appreciate it. We don't scare them with it. They can establish their basic financial goals, their sales, food, labor, their expense cost, all the operating accounting. From that we go into an understanding and application of management principles; planning, you plan an operation, you organize it with forms. This is what franchising is. McDonald's and everybody forms and controls. The form governs the operation. Then how to act' leadership, whatever. And then any other recommended greetings on management that will help them.

From that we go into a heavy area of the operating budget. We go through exact examples. We take case histories of various operations, they work with it. That's the only way to learn. I have noted, and others have noted that you can sit in a classroom and put out paperwork. Unless the man is doing it, he doesn't really learn it. I doesn't lock in. We find it takes abount 5 days of working with it before it locks in. They are given a case history to work with. It enters their memory banks. They go out in industry and maybe a particular firm has a different form, but they know how to do it. We are

concerned at the school. Our concern is that the learning is retained. Beleive me, if you go into instructional objectives on a large scale its very difficult. We do have instructional objectives. It's very important in setting up any kind of education. Setting these up and testing them to see what they retain we don't just dump information and test their retention.

We go into a personnel cycle. This is very important. It's called group dynamics. Working with a supervisor, working for a supervisor as I have stated before. We have a psychologist teaching a supervisory development program. We teach the how to work together. In fact I quote them in one experiment with a little criticism.

They had the students on the 4th floor develop a project and work together to determine its success. They took two bricks, a roll of toilet paper and lowered the 4 stories. This was their project in working together. Of course, I got them to let them work on some food service projects. But we did get students working together, working with a student supervisor. We've gone into table service projects and many other projects including human relations.

We're introducing human relations into our first term. We work with groups, teach them how to work with their instructor; how to work their fellow students because we have found that sometimes in a cooking course the lead students stand around the stove and other ones starve to death. We teach them how to share. We had to teach them how to get everybody to clean up and avoid the poor soul with the low eye who slipped in our admissions doing all the dirty work. We didn't want the same thing that was happening in industry. We want the highest, the best skilled to do cleaning. We want to get them into that habit now, because sanitation is a tremendous area. They all ask "who me, why should I clean?" I'm a big shot, No, everybody cleans. We train them, we indoctrinate them, we brainwash them. In that area we hit them over the head.

Cleanliness is very important, and if you're a good supervisor you train other people to clean.

We go into man hours planning. How to plan schedules for the area of food service that's very important. If any of you are into the technical education, the most important thing is planning labor costs. Food costs we can control but your labor cost, that's a very expensive commodity, and you have to learn to control every aspect of it. Pay well! You get what you pay for but don't pay for what you're not getting. We train them how. We make them see the problems of management. They in turn become respectful, and not demanding. We have a force control aspect where we analyze. Everyone should analyze every employee, all aspects of food costs from the receiving to the final selling to the customer. In other words, in our food service, if you put out a fine product a customer trades money for that product. The product develops a utility. We manfacture a product, we design a product that the customer will trade money for and anything wrong with that product, not prepared properly, whatever, the customer is not going to trade money. If it's proper they'll come back. McDonald's is doing it. They come back. It's like a machine, they'll come back because they know what they're getting. They're paying for it.

We teach labor cost control. We teach them that time and a half is a no no from the beginning. Plan properly. We have had this problem in industry in food service. Everybody works 12 hours a day. It is rediculous. A man is capable of an 8 hour day. His capability diminishes beyond 8 hours. We are trying to convert to 8 hour schedules and make them appreciate it. So what if you get $600 a week. You work 90,000 hours. You average $1.10 an hour. You know some of these people, they look at the money. They don't look at what it takes to earn it.

We go into insurance coverage. I have a case history, an individual spends $20 million and he builds a restaurant on top of a 40,000 foot mountain. He needs oxygen, pressure. You can only get there by pressurized helicopter. A customer comes in, he is some famous psychiatrist making $5 million a year. He sits down to eat and orders filet of fish. As he starts eating there is a bone in it. He gets up and slips on the floor. He goes out the window. Now you don't know what he died from, the sudden stop when he hits the ground from 40,000 feet, oxygen starvation or the bone. But you have a law suit. If he is 30 years old and his life expectancy is til 50, he has 20 years to go at 5 million a year. You're wiped out of business. So we go into insurance.

Public and private liability, and you're home free. Not that you want that to happen to the customer, but you need coverage when you do open your own business.

If you're going into productivity, you want the customers, You can start initially with tonage but they won't be coming back the next week.

My final thing, we have an individual putting out roast beef sandwiches using a micro wave. Everybody gets a micro wave. They don't know how to use it. He was using commercial cow tenders. It enhances the flavor. And he was taking rare commercial tenders and giving them about 30 seconds, 220 volts. What was happening, it was magnifying the tainted commercial flavor. The first week he was knocking anywhere from 200 to 1000 sandwiches a day. I hit him just before the tail end of the week. I spoke to him, I said what do you have, everything out. I said to him, you're not going to sell any sandwiches next week, he threw me out. Then he called me back. He didn't sell any sandwiches because everybody had that first sandwich, he didn't test his product, he didn't taste it. It had a commercial cow flavor that you couldn't hide with barbeque sauce.

So you can do quantity but you have to analyze to produce. Train your people to be conscious of what is going on, to test products.

In summation, we are developing and we should develop professionals that are dedicated and their security in a particular firm is not based on the dollars they are getting from this firm, but the security that they are welcome, they are needed for their ability and professionalism. There is security in that. In those words, the owner, the owners, the firm maintains and gives them the security based on their ability.

"THE ROLE AND FUNCTION OF THE NATIONAL NETWORK FOR CURRICULUM COORDINATION IN VOCATIONAL TECHNICAL EDUCATION"

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In education, I think particularly in vocational technical education, although it is very hard to put a financial handle on it, we in New Jersey figure that a vocational technical student is probably twice as costly to prepare as a general academic student. Because we are living in days of very precarious resources, we find that our resources are really not quite enough to enable us to meet the challenge that confronts us. We have to do the best we can, of course, with what we have, so we try. Now as part of this, we do a lot of wheel spinning, we waste a lot of resources, we waste a lot of time, we waste a lot of money, in the area of curriculum. Now in order to combat this, some years ago (approximately in 1972) the U.S. Office of Education thought that perhaps in the area of curriculum we could cut out some of the waste of resources by putting together a network that would enable us in all of the 50 states and territories of the U.S. to share each others' work. It was felt that perhaps curriculum developed in one place could be transportable to another place, or at least serve as a basis for modification in another place. Because of this, the U.S. Office of Education put out "Requests for Proposals".(those famous RFP's) How much better was the actual RFP than the one we're hearing today, RIF, which means Reduction in Force. They decided to put out RFP's to try to get a national network established. As you know in the vocational technical education area, this had been kind of a chronic wish for a long time. The RFP's were placed out on the market; people responded to the RFP's; there were

some happy winners and there were some unhappy losers. In all, five curriculum laboratories throughout the country were awarded grants to begin the assemblance of a network for curriculum, dissemination, and coordination. The five at that time were Illinois, Mississippi, Kentucky, Oklahoma and California. Think of this again, Illinois, Mississippi, Kentucky, Oklahoma, and California. And when you think of them, do you notice a little geographic problem? I have to think that these awards were made on the level, based on excellence of proposal. The reason I say that is because I submitted a proposal at that time to meet the RFP and lost. So I have to think that everything was on the up and up. When we analyzed the national map, we saw that of the five laboratories that had been awarded these grants, there were two very very big voids. The first in the heavy populous, northeast the second in the large territory of the northwest. Now, the winners of these awards were to improve their own capability to do a job within their state. At the same time, these laboratories were to begin forming a network of surrounding states. A year later, the void in the northeast and in the northwest then decided to put out two more RFP's, and we were lucky enough to have our proposal accepted. In the northwest, the state of Washington, J. Wood helped write the proposal, and it was accepted. So the state of Washington became a curriculum center for the northwest area. In 1973, we had seven centers spread throughout the country that were to actually form the basis for confederated network. A year later in typical definite bureaucratic fashion, it was discovered that the seven networks that had been established were actually transcending the United States Regional Offices. So a move was made to combine the network into areas that actually coincided with the Regional Offices. As it turns out at the present time, we

actually have six centers in this national network. The first, not in importance necessarily, although we like to think so, is in the northeast which is led by our center in New Jersey; the second, which is in the southeast, led by Jim Wall's center down in Mississippi; the third is the mid-east, which is led by the Illinois center; the fourth is the mid-west, Oklahoma; the fifth is the northwest, led by the center in the state of Washington; and the sixth is the western council which is led by the center in California. So we have six centers which have established networks in their various areas and combined together, have become the national network. Now what is the job of the national network?

Well, first of all our job is to try and make the entire nation one giant curriculum neighborhood. A big job, but we are trying to do it. We are talking of 50 states, 48 on the continent, Alaska and Hawaii, plus Puerto Rico, the Virgin Islands, Guam and the other Pacific Territories, altogether in the national network we have 56 governmental units, 50 states and 6 territories. What are we trying to do? Well, mainly we are trying to get educators more and more interested in materials and our big dream is that we can someday have a situation, fiscal and otherwise, where we can train the educators how to use these materials which are being provided by the many states. Our job is trying to keep people up to date on what kind of materials are flowing out of the various states. It is very, very helpful when someone in the state of Maine can call on someone in the state of New Mexico for curriculum information. And, maybe as a third, our job is to develop and distribute these materials. Now that is a little misleading in that the network itself does not really do much developing. In other words, the resources provided do not enable us to do much

development within networks, but the various states do a lot of development and then we are able to distribute, disseminate, and in some cases, diffuse their materials. For example, the state that is very productive curriculum-wise is Illinois. Now, all the states in Illinois' region do not produce as much good curriculum as Illinois. Illinois has a very fine financial base. In New Jersey, we do a pretty good job. Oklahoma does an excellent job. Now, then all of us have a network by which we can profit by the development in those various states. Quite frankly, in our northeastern area, we have a number of the smaller states, who's main objective in being involved in this network is to be recipients of the benefits, and they make no bones about it. They say we do not have the manpower, we do not have the resources, we do not have the where-with-all to do the development ourselves in most cases, and we are very happy to profit by the curriculum developed elsewhere and then modify it for our own needs. So it works out very well, with the states which are the happy givers and the states which are the happy receivers.

We also try to have this network coordinate with agencies at all levels. Now, it is relatively easy to coordinate, for instance, on a state level. Where we run into difficulty is on the local level. We can coordinate fairly well, nationally, because the directors of the six centers that we talked about previously work as a national council, and we try to have interaction and interrelationships with many of our counterparts. It is fairly easy in general to do it on a regional level and not too hard on a state level, particularly in a state which has a pretty good curriculum organization. But we do have trouble coordinating on a local level. What I'm trying to tell you is that these networks, intra-state, are not as yet developed to

the best possibility on a local level and it is there where the payoff is. We try to coordinate and interrelate with such groups as shown here. Now, if we can get the benefit of all the people who are producing materials and curriculum for our work, when we reach that happy millennium, when this can be done, I think that all of us can profit a great deal and use our money most efficiently and wisely as well as our time, as far as curriculum is concerned.

We have been involved very much in career education as well. Now, I don't know what your feelings are about career education, but it seems to me that the schools from where the vast majority of our students come, too long have been focused on an educational philosophy, academic training that has long since out lived itself, historically. It seems to me that the philosophy of academic training for all youngsters, which was education, focused back in 1890, and that philosophy has long since gone by the boards. Only I don't think our educational establishment has yet caught up with their new mission, their expanded, extended mission. In New Jersey, we are aiming for 60 percent minimum of the students in our schools to be involved in professional education by 1985. Currently, we have 30 percent. We are aiming for 60 percent in 1985, and we think that the only way to do this is to change our curriculum in the early grades so that we have people in a better position, with a better knowledge of the world of work to be able to make choices, to be able to match their aspirations interests, and inclinations with what is available to them, skill-wise, interest-wise, in the world of work. We have studies which show that a child entering first grade already had biases as far as occupations were concerned. We have studies which show that in non-verbal ways, kids can actually provide a heirarchy of occupation as to which is the best sociologically, which is the best economically. We have studies

which show also that when a kid is in the first grade, he already has sexual biases, as far as occupations are concerned. So it is really not a matter of taking a clean chalk board and writing on that chalk board, it is a matter of taking that kid coming into first grade and erasing what is already there. Our studies have shown this, so we have been very active in career education because we think that is the necessary and essential platform to vocational technical education.

National network - we aim to improve curriculum materials, to design curriculum, develop formats, we had a great deal of trouble with it because no one is willing to settle for one kind of curriculum format. We try to put together instructional packages to design task analysis instruments to demonstrate exemplary projects. We had a meeting a year or so ago out in Illinois, southern Illinois University, in which we brought in some of the better curriculum projects in the country. I want to tell you that when I left there I felt that I had been to the best educational meeting that I had ever attended, with the exceptions of those at which I was a speaker.

Not too long ago, Ohio State University, wanted to do a project on task analysis, job analysis in three fields - auto mechanics, secretarial, and data processing. And it asked for the cooperation of the centers at that time and asked us to pick a couple of other states to help - I think we had 8 states altogether. Our job was to go out and interview practitioners in these three fields and to interview their supervisors to see how the practitioner viewed his job, to see how the supervisor viewed the practitioner's job or those elements that made them up, and then to try to construct a kind of task analysis of these three jobs on the basis of priority. It was an extremely interesting research but how nice when a job like this has to be done

and to be able to have the organizational where-with-all to do it. Ohio State called upon the centers to do it, and it worked out very well.

We disseminate in many ways to make curriculum available. The best way to disseminate materials is hard copy, most people love to read hard copy, and I'm one of them. However, there are certain problems in hard copy that make it very difficult. It is quite expensive, it is quite time consuming, it is difficult in many ways. Now, we in New Jersey, and this is not true in the other states, have adopted a microfiche format, now we know that this leaves something to be desired, but it enables us at all times to meet requests for materials. When somebody wants something they get it, and they get it within a week because we cannot provide everything in hard copy, but we do get the materials to the microfiche and in our own state, we have located at the various vocational schools and colleges and other educational centers throughout the state, we have distributed microfiche readers so that people that are interested in curriculum material despite some of the problems of microfiche, have this type of reader available.

Four times a year we put out The National Network News and each of the six Regional Networks puts out its own newsletter. We call ours Curriculum Notes. Each of the various regional networks has some sort of a newsletter with which it attempts to communicate with the states within its region. We have catalogues, bibliographies, etc. One thing we are in the process of doing right now, which we think is going to be extremely well received is to distribute this kind of thing, which we actually copped (with permission) from a Title III Project. And these are the glossary of terms in radio, TV repair, etc., taken from the vocational reading dollar project out of Michigan.

Altogether, we are coming out with 18 packages of this kind, and we think that they will be very, very helpful in our chosen field. You may hear more about these as time goes by; we are right on the verge of distributing them. We try to organize curriculum services within our region and within our various states and hope to get down to the local level. We try to establish, for a region, the curriculum priorities in that region; we try to provide in service workshops; we are working on a project now in which we will be sending people from our center out into the region to provide workshops on the use of games and simulated materials and vocational and career educations.

It is very interesting to me, using the term 'change agent', that there is nobody whose job it is to be a 'change agent' to the extent that a teacher is, and yet, ironically, a teacher was human before becoming a teacher. And the 'change agent' is very often most reluctant to change. We try to maintain an alliance with this type of group. There are many instances that of the people involved in various networks, we sometimes hear about some emity between our various state research coordinating units and the national network. There are many instances that the people that are doing the work in the National Network are you people. I happen to be the head of the RCU here in New Jersey and a lot of my big responsibility is the National Network; the same is true in a number of areas.

Other miscellaneous services: we try to collect data, analyze the data, disseminate it, and keep people informed. In this day of fiscal crisis, it is a very important job. It is very interesting in that it gives you a good feeling when you get a letter from the center placement spot in the northwest, and he says we have some

community college people out here who are looking for XYZ, do you have it? And we put the request out of our network, as do all the other centers, and the first thing we know, the materials start flowing back to us on XYZ and then we send it out there. Then somebody from across the country is able to profit by the work we have done. Another good example is Puerto Rico. Puerto Rico happens to be in our northeast region. Puerto Rico, as you know, has had great financial difficulty even before the rest of us have had and was able to take a lot of the work done particularly by New York and New Jersey and convert that work into the native tongue - Spanish. For the price of translation they got myriad curriculum. So it was very important, very helpful.

As I told you before, we meet together quarterly. We also bring our groups together about three or four times a year, depending on the needs and try to keep abreast of what is happening in all of the various states, to the best of our ability. And as we do this, we are able to know perhaps where in curriculum building and developing we should concentrate and where other people are way ahead of us, and perhaps we can profit by their work. We try to take the work that is done in all areas of vocational technical education or at least done in many areas. We try to take the RCU works, the works of the various state departments and convert it in such a way into a transportable kind of product so that it can help students on all the local levels. I would say that we have not developed it to this extent yet, but I think eventually, if we keep working on it, it will get to a point where we can establish intra-state networks so that all local schools will eventually be able to profit by it. But, like everything else, it takes time to develop. One of the problems we

run into as in many states, is that so many people in the area of curriculum do it as a slice of the job. In other words, so many states have people who only do this as kind of one-tenth or one-fifth type thing, to the extent that a very important element in the educational process is given kind of a short trip. We do a lot of talking about the importance of the child in education, and we do the same about the importance of the teacher. But we give a short trip to the bridge that ties the student and the teacher together, and that is the educational plan, the curriculum.

"MANAGING BUILDINGS FOR EFFICIENT ENERGY UTILIZATION"

Robert F. Smith
West Side Institute of Technology

TECHNICAL EDUCATION OF BUILDING ENGINEERS FOR EFFICIENT OPERATION OF BUILDINGS: A FORMAL PROGRAM

To develop a program for training building engineers, it is first necessary to know what a building engineer must do. This is, of course, a requirement to develop any training program. An effective training course, then, would include instruction on how to do the things that are the responsibility of a building engineer.

How do you determine what is going to be required of a building engineer? Our approach was to ask the people that hired building engineers. We asked them what prerequisites were required and what they expected the man to be able to do after they had hired him. Once we received the answers to these questions, we decided what material had to be included in our course. This is the first step in developing an effective training program. But, it is only the first step, and you must be very careful how it is conducted. You must contact many people and be certain to obtain varied opinions so that you have a cross-section of what the industry requires. Do not forget that this is only a starting point. After the course is developed, it must constantly be up-dated to be certain that you are teaching information that is required today - not what was required 20 years ago. For our particular case, we have been in contact with over 300 companies that hire our graduates. We are constantly receiving information from them to add new material to our courses as new advances in our technologies are developed.

There is another source for this information that is frequently overlooked by those who are responsible for the material that is included in courses such as ours. We have found that people who are actually doing the job can be very helpful in suggestion changes for our curriculum. We maintain close contact with our

graduates and have instituted many changes and added new material to our courses as a result of their suggestions. As a matter of fact, we have recently developed and are now conducting a special course as a direct result of comments we had received from former students. They told us that they were being confronted with controls that were not discussed in our courses. After we heard this from a number of them, we conducted a survey of our past graduates. We then contacted several of our graduates who have businesses of their own or in supervisory positions with larger companies. The results of our survey were discussed with these men and it was decided that there was a need for a course that included this information. We then picked representatives from this group to attend the first course. They are being encouraged to comment not only on the course content, but on how it is being taught. All of their suggestions will be considered and many of them will be adopted the next time the course is conducted.

This point cannot be over emphasized. We are in the business of training people for jobs. If we are to do this we must know what the job requirements are. There can be no better source for this information than those that are doing the job and those that hire them.

At one time, the building engineers' job was to operate and maintain a boiler. He had to be able to "fire-it-up" and keep it running. Most important was that he could do this safely. He had to understand temperature-pressure gauges, safety devises and feedwater systems including regulators and heaters. Depending on where he worked, he might also be responsible for equipment such as pumps, engines, and turbines or accessory equipment such as superheaters, soot blowers and condensors. He would also be expected to know what to do it any of these controls or operations malfunctioned and how to repair or replace controls or components as required.

Generally, if one had a Stationary Engineers' license, that would be considered as evidence that he could do the things required of a Building Engineer. In fact,

this would be required if the boiler were over a certain size, depending on local codes. Today, it is not enough that a man just understand the operation and maintenance of boilers and related equipment. But, he must also know how to perform preventive maintenance functions. He must be familiar with the basic operation of refrigeration equipment and the functions of heating and air-conditioning controls. Following is a brief outline of our Building Engineer Course:

Basic Electricity

Refrigeration Operation and Maintenance

Unitary Gas and Oil Heating

Steam Plant Operation

State License, History, Requirements, Regulations

Boiler and Cooling Water Quality Control

Combustion Control: Oil, Gas, Coal

Refrigeration, Gas, Oil and Water Piping, Valves and Fittings

Industrial Power Distribution Systems

Industrial Ventilation

To give you an example of what material is actually included in the course, a session-by-session outline of the water chemistry portion of the course is attached to this description.

Note that "Basic Electricity" is included in the above outline. Why is this subject included in the content of the Building Enginneer's course? The answer to this question leads into our philosophy of training. A man should not only be taught what he must know, but why he must know it. Further, he must be shown How to perform the job requirements and lastly, but most importantly, must actually operate the equipment and use the tools, gauges or other instruments necessary to determine if the equipment is operating properly or what is wrong when it is not operating properly. Basic electricity is included in our course because we believe that a man must be familiar with "why" something works as well as the "how"

if he is to perform effectively.

Also listed in the above outline is "Combustion Control: Oil, Gas and Coal". Included in this subject is information relating to using the fuels indicated efficiently. Again, not only the what, but the how, and why fuels should be burned efficiently are important. How can controls be adjusted to obtain greater efficiency? What instruments are required to determine if equipment is operating efficiently? How are they used? These questions are answered in our course and then the student applies what he has been told in the classroom to equipment in the laboratory.

So far, we have discussed what should be included in a Building Engineer's course. Also important and maybe even more important is how this information is taught. Having the best information is the world doesn't mean a thing if the student doesn't learn it. Certainly, each instructor must have freedom to employ his own individual techniques. However, we have found that there are some basic methods that are not only helpful, but we believe necessary to achieve the desired results. Our experience in being able to place a very high percentage of our graduates and the response we have received from those that employ our graduates enforce this belief.

How do you teach a Building Engineer? Our approach is to first of all tell him what we are going to teach him. At the beginning of the course, in fact, during the first session, he is given a general outline of the entire course, and is told what he should know by the time he completes it. In this session, the students are also told exactly what is expected of them it they are to be successful. This is very important, do not assume that they know how much they should study or even that they should read the material. Tell them how much time they should devote to study outside the classroom.

Each subsequent session is started by telling the students what is to be discussed in that session. Each subject is then discussed in detail. For example,

if a component is being discussed the students are told what it is, what is is used for, why it is used, and how it works. When possible, examples of the component are distributed among the students. Frequent use of cut-aways help to explain the operation. An explanation of how each component functions in the entire system and any wiring that may be necessary together with the complete circuit helps the students understand the component completely. Furthermore, because he has received information not only on the specific component, but how it relates to the entire system, he has more confidence about the knowledge he has acquired.

To help the student retain information that has been discussed, it is necessary to present it to him several times. This is accomplished by discussing the same information from different angles; by use of various training aids, principlely audio-visual equipment; and cut-aways, quizzes and tests. For an instructor to be able to do this effectively, he must not only be well educated in the subject but have considerable field experience working with the equipment. Another quality that is required for an instructor to be able to train people to perform any job is that he must truly want to train them. He must be sincere in this desire or the students will not learn from him. We have had several men whose education and experience were all that could be hoped for, but they were not good teachers. They were not good teachers because they did not really care if the students learned anything or not. It was just a job to them and the students sensed it and could not learn from them. Finally, there is one other requirement for an instructor to be effective and that is that he must talk to the students on their level. When it is necessary to use terminology that sounds complicated, but is commonly used in the industry, it must be explained in terms that the student understands.

Once the student has a good understanding of the theory, he should then actually work on the equipment. For this purpose, a well designed and equipped

laboratory is an absolute necessity. First of all, there must be enough units so that all students can be kept busy during the entire time devoted to this purpose. Secondly, a variety of projects which will show the students how the individual components perform their function on actual applications. This is particularly important when some of the normal operations encountered in the field do not appear to match the text book explanation of how it works. We believe that our facilities meet these requirements. In fact, we have been told by many visitors that they have never seen anything to match our training facilities. Some of these are people who go all over the country inspecting schools and so we are very pleased to receive their comments.

Because of the time allowed to present this subject to you, I have not attempted to go into any details but to simply indicate some of the more important requirements to effectively teach Building Engineers. In summary then, it is necessary to:

1. Obtain information a Building Engineer must know;
2. Qualified instructors are imparative;
3. Teach not only specific data, but all related information;
4. Teach all aspects of each subject;
5. Each subject must be discussed several times; and
6. Students must work with the equipment.

We believe that if these suggestions are followed, a successful Building Engineer's training program will be the result, a program that trains people to do the job required by industry.

WATER CHEMISTRY

A. PRINCIPLES OF WATER AND WATER CHEMISTRY

Session 1

1. Water as a National Resource
2. Water Quality Standards
3. The Hydrologic Cycle
4. The Classification of Water
    a. Classification by Source
    b. Classification by Usage
5. The Distinction Between Chemical and Physical Changes of Matter

Session 2

1. The Atomic Theory
2. Types of Chemical Bonds
3. Metals and Nonmetals
4. Acids, Bases and Salts
5. The Measurement of Acid and Base Levels
6. The Measurement of Mineral Levels
7. The Theory of Ionization

B. THE APPLICATION OF WATER TECHNOLOGY TO BOILERS

Session 3

1. The Corrosive Gases: CO_2 and O_2
2. Properties of the Corrosive Gases
3. Treatment for the Corrosive Gases
    a. External Treatment: The Feedwater Heater
    b. Internal Treatment: The Boiler
4. Quiz: Water Chemistry Fundamentals

Session 4

1. Solutions and Suspensions
2. Hardness and Nonhardness Minerals in Water
    a. Water Softening v. Water Demineralizing
    b. TDS: (Total Dissolved Solids)
3. Temporary Hardness and Permanent Hardness
4. Temporary Hardness Minerals and Their Treatment - THE LIME PROCESS

Session 5

1. EXAMINATION No. 1
2. The Determination of Temporary Hardness in Natural Water Sources
3. Permanent Hardness Minerals and Their Treatment - THE SODA PROCESS
4. The Lime-Soda Process

Session 6

1. Modern Internal Boiler Water Treatment
2. The Determination of Water Treatment Levels
3. Practical Analysis of Treated Water Chemical Levels
4. Sludge Conditioning (Boiler Supplementary Treatment)

C. WATER PRETREATMENT PROCESSES

Session 7

1. The Lime-Soda Process as a Pretreatment Method
2. The Advantages and Limitations of the Lime-Soda Process
3. Computing Chemical Requirements for the Lime-Soda Process

Session 8

1. The Sodium Cation Exchange Process
2. The Development of "Synthetic Zeolites"
3. The "Zeolite" Cycle
4. The Advantages and Limitations of the Sodium Cation Exchange Process
5. Computing Regenerant Levels and Gallonage Per Zeolite Cycle

Session 9

1. The Hydrogen Cation Exchange Process
2. The Advantages and Limitations of the Hydrogen Cation Exchange Process
3. The Selection of the Lime-Soda, Sodium-Zeolite or Hydrogen Cation Pretreatment Process as Determined by Water Requirements
4. The Anion Exchange Process
    a. The Weakly Basic Anion Exchange Process
    b. The Strongly Basic Anion Exchange Process

Session 10

1. EXAMINATION No. 2
2. The Reverse Osmosis Pretreatment Process
3. The Advantages and Limitations of the RO Process

Session 11

1. The Undesirability of Iron Minerals in Water
2. The Treatment of Iron in Iron Bearing Waters
3. The "Iron Bacteria"
4. Sulfur Bearing Waters
5. The Control of Sulfur in Sulfur Bearing Waters
6. Sedimentation, Coagulation, Settling and Filtration

D. THE APPLICATION OF WATER TECHNOLOGY TO COOLING WATERS

Session 12

1. The Classification of Cooling Waters
2. The Design and Operation of the Water Tower and Evaporative Condensor
3. The Necessity for Control of the Four Contaminating Agents in Cooling Waters
    a. Organic Growth
    b. Mineral Deposits
    c. Corrosion
    d. Sedimentation

Session 13

1. Types of Plant Life Affecting Cooling Waters
2. Necessity for Control of Organic Growth
3. Life Requirements for Algae and Fungi
4. Treatment Methods and the Use of Algacides
5. Methods of Application of Algacides
6. Necessity for the Establishment of a Treatment Schedule
7. Quiz: The Pretreatment Processes

Session 14

1. The Effect of Scale Formation on Cooling Systems and the "Cycles of Concentration"
2. The Determination of the "Cycles of Concentration"
3. The Treatment for Scale in Cooling Waters
4. The Use of Sequesterine Chemicals in Water Towers
5. Tower Cleaning

Session 15

1. Necessity for Control of Corrosion in Cooling Waters
2. Causes of Corrosion
    a. Acids
    b. Algae and Bacterial Slimes
    c. Oxygen
    d. Impingement
    e. Galvanic Activity
3. Treatment Methods for Control of Corrosion
    a. Anode Inhibitors
    b. Buffering Agents

Session 16

1. Review of Course
2. Final Examination No. 3

"MANAGING BUILDINGS FOR EFFICIENT ENERGY UTILIZATION"

James C. Martini, Instructor
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Wherever buildings, building complexes, industrial plants and commercial businesses exist in the United States, the management of energy conversion is necessary. The National Association of Power Engineers has defined "power engineer" as: "one skilled in the management of energy conversion." In this time of extensive national effort in the area of conserving energy, the power engineer with the specific knowledge and skills necessary to function to provide efficient utilization of energy, becomes the most important person in this national effort.

According to the U.S. Census Bureau, there are over 350,000 "identified" power engineers in the United States. This number would quadruple to over 1,400,000 should all those operators, building engineers, firemen, and even custodians be recognized as the "real power engineers" through intensive study of job patterns and duties. This larger number is the one which must be taken if true energy conservation in buildings and plants is to be our national goal, as without serious consideration of all large energy users and large numbers of small energy users, the goal will never be realized.

Through the cooperative efforts of The National Association of Power Engineers (an association with a ninety year history), and Henry Ford Community College, an effort to establish the "Profile of a Power Engineer" was initiated in 1974. The purposes behind such a move were multiple, but primarily were aimed at the improv-

ement of training and education of power engineers. In addition, with the thrust of government regulation, particularly in the energy conservation area, this study took on new meaning to focus in on the specific skills and knowledges necessary to effective and efficient energy utilization by power engineers.

The specific goals of the study included:

1. Identification of major task areas, subjects required in power engineering curricula and the various job titles used for power engineers.

2. Major subject matter analysis of initial subject data from existing programs and from the study of duties and responsibilities of power engineers.

3. Identification of major and minor task areas and further documentation through additional survey instrument specific tasks of power engineers.

4. Task analysis and task detailing through selected individuals in specific types of occupancies and all geographical locations.

5. Preparation of goal statements, performance objectives, course outlines, and programs for the education and training of power engineers.

6. Preparation of instructional materials.

7. Field testing and feedback of trial instructional materials, curricula, programs.

8. Redevelopment, retesting and additional evaluation.

9. Program continuity projections with updating curricula sessions annually.

To this point, two survey instruments have been administered analyzed, and data recorded. Preparation of documents relating to the application of the survey data is presently in progress. Instructional materials in some identified areas are under development.

From the collected data many conclusions may be drawn, even with this data in its rawest form. Some of these are indicated below:

Job Title: The most frequently used title was stationary engineer, with operating engineer, boiler operator and firemen accounting for most of the remaining.

Job Orientation: Of those polled, the occupancies indicated a near equal mix between industrial plants and institutional or residential plants. This would tend to support the comment made earlier relating to identification of all power engineers, particularly those who when working under another title such as building engineer or custodian would be identified and placed in the "institutional" catagory, making the actual population much greater.

Energy Handled: An item indicating the type of energy inputs to the equipment the power engineer operates, it included gas and oil equally split, with diesel and coal a long second, and hydro and nuclear power a long way beyond these. As much as 80% of all the fuel handled by the power engineers is either oil or gas, which of

course is not suprising, but when designing instructional programs, in the technical area, it becomes very important.

Energy Produced: Production of heat, light and power is the job of the power engineer. These outputs when handled in the quantities necessary require specialized training of the power engineer to insure efficient and effective production and distribution. Heating was identified as the most frequent energy produced, with cooling equipment operation next and electric power following these. In addition, air, process steam, refrigeration (other than air conditioning), and distribution of electricity were indicated by those completing the survey.

Formal Education of Power Engineers: An important fact relating to the education of power engineers, and subsequently confirmed through an additional nation-wide survey of education insitutions, is that very little educational opportunity is available to the power engineer in the formal education structure of this country. According to the data collected, less than one-quarter of those surveyed indicated any formal education contact beyond high school. This must be attributed to the fact that there are less that twenty functional programs in this country which provide valid education for the specific needs of the power engineer. This undoubtedly has had an affect on the effectiveness of the power engineer in performing his job in an efficient manner.

Training of the Power Engineer: In the absence of formal education programs, many plants have instituted extensive on-the-job training programs such as in the utility industry. Where large plants and sizeable equipment is involved, the obilgation to fully train the

power engineer is not taken lightly. This is not true in the smaller plant or individual buiiding or building complex, where on-the-job training is in many cases non-existent. The survey turned up evidence indicating that about one-third of the power engineers were trained on the job, with special training from some institution or professional association such as NAPE came next. Correspondence instruction accounted for approximately 14% of the courses included by some power engineers, while over 30% indicated that they had taken one or more courses through a formal education institution. Less than 8% indicated the completion of an apprenticeship.

Licensing of Power Engineers: Approximately one-half of the power engineers polled were licensed. With an additional survey, it is noted that licensing is present in some form in 34 of the 50 states. However, only nine states have state-wide licensing programs. Licensing is considered an important program in the field of power engineering in that it provides the means for industry to meet existing and future regulatory requirements, and provides a path for power engineers to advance in the profession by moving from one license class to another.

In areas without licensing, employers have difficulty documenting the requirements of the power engineer, through experience and actual accomplishment in competency examination. It is also difficult for the power engineer to move from one job to another since without a license he would have no established, standard, level of competency.

Basic Technical Training for Power Engineers: In spite of the ability

of formal educators to classify the various occupations in technical education according to their basic education requirements, the respondents to the questionaire in this area indicated personal education they had received, rather than what might be desirable. This information must be interpreted in the light of this intent, not as that which might be necessary for future power engineers. Primarily, mathematics in the simple math area, and applied math area were indicated as the most frequently taken by present power engineers. Advanced math in the form of algebra and geometry accounted for less than 20% of the total. In the science areas of physics chemisty, physics courses were indicated as more frequently than chemistry courses. In technical education courses, nearly every area found in the community college and technical college technical programs was indicated including: welding and cutting, mechanical drawing, instrumentation, electrical and electronics, machine shop, and processes.

Other areas indicated by polled power engineers as necessary to safe and effective operation on the job included: Reading ability at the 12th grade and higher levels, report writing, technical writing and reading, speaking and expression of processes in words, and safety in the occupational, personal and tool areas.

It is important to note that as of this point in this presentation, nothing has pointed to the education of the power enigneer to provide for energy conservation. This subject is not taught in the formal education institutions, with the exception of a few highly respected institutions which have taken the time to examine and

document the requirements for power engineers with this subject in mind.

Specific Occupational Sequences Necessary to Energy Conservation

In the survey instruments, specific equipment and specific operations were placed in such a manner as to cause those most frequently used to be identified. In determining which of the subjects are necessary to require specific attention in curricular development processes for teaching energy conservation, it was necessary to make some assumptions. These included: 1) The building and equipment of each plant had been adequately designed and installed, 2)the power engineer in each case would have the ability to make changes and adjustments upon receiving the specific training, and 3) the necessary instruments, tools and equipment would be available for the power engineer to initiate programs which would provide energy savings.

Specific education and training in the following areas would assist the power engineer in buildings and plants to provide an improvement in energy conservation:

Boilers

Operation, Maintenance including:
Combustion testing and adjusting
Fuel handling and delivery
Boiler control and accessory cleaning and adjustment (water columns, blow down, pressure controls, safety valves)
Combustion air equipment fans and delivery
Fire side inspection and cleaning

Water side inspection and cleaning

Operating practices allowing minimum energy consupmptions for each load

Water treatment, equipment and methods

Auxiliaries — Operation, Maintenance including:

Centrifugal and other types of pumps

Feed water heaters

Feed water deaerators and equipment

Condensate return pumps

Steam traps

Steam heating piping systems

Hot water heating piping systems

Air compressor and air systems

Cooling Systems — Operation and Maintenance including:

Cooling unit operation and maintenance and adjustment

Circulating water systems

Cooling towers, and their systems

Filters

Air handling units

Other Systems — Operation, Maintenance including:

Electrical, lighting, electric motor operation and maintenance

Ventilation and exhausting systems

Although this list above is not all inclusive, the major elements

identified in the survey instruments, as mentioned by the power engineers, provide clues to the type of training which would be necessary to get at real energy savings. Obviously, if this list were handed to a public educator, an immediate transfer would occur to the curriculum with which this person might be most familiar. It is safe to say, that this type of curriculum does not exist in present community colleges today, except in special instances which will be covered during this session. It is therefore necessary to fully identify each of these subjects (and others required by particular situations in different plants or buildings) and to develop specific skill and knowledge sequences to provide the desired outcomes.

For Example: The average approch to teaching "boilers" in the community college or trade school is to set up a class, find an instructor and allow the instructor to teach this subject as he perceives it. This usually results in a great portion of the course being taken up with history and boiler nomaclature without getting to the heart of the matter of boiler operation and in particular, energy conservation through proper boiler operation and adjustment. Power engineers taking such a course have "had training", a quality which has not improved their value to the employer, the company nor the nation.

With energy conservation as our goal, as well as basic knowledge, boilers as a subject must be treated differently. This is shown as follows:

Knowledge Area: Boiler Combustion for Efficient Fuel Consumption
- Burner functioning

- Fuel system functioning
- Air system functioning
- Combustion theory for fuels utilized
- Stack gas analysis
- Control system Functioning
- Basic test instrument function and use
- Basic tools - use to adjsut and test

Skills Required: Boiler Combustion Adjustment for Efficient Fuel Consumption

- Starting - stopping burners
- Preparing burner for operation
- Preparing fuel system and fuel for operation
- Checking the combustion through flue gas analysis
- Adjusting the combustion system.for proper combustion
- Checking combustion during operation
- Reading combustion test instruments
- Interpreting the readings of combustion test instruments
- Making records of combustion processes and fuel consuption
- Calculating efficiency of burners

As might be realized from this example, there is much more to providing specific training for an occupation than creating a class, hiring an instructor and teaching subjects related to the particular job area. This however has been what has been happening in many areas. In power engineering, this cannot be done if real energy savings are to be realized throughout the country.

The power engineer profile, when completed will provide comprehensive information for the public and private school education systems in the United States with a view to offering performance objectives and specific skill and knowledge areas fully defined. With this information, valid courses on the specific occupation in a particular part of the country may be put together, with valid skill and knowledge elements fully included to provide power engineers with energy conservation abilities.

"MANAGING BUILDINGS FOR EFFICIENT ENERGY UTILIZATION"

Peter H. Burno, President
The National Institute for
Uniform Lecensing of Power Engineers

Energy conservation in just a few short years has become the number one issue across this great nation due to the effect of the lack of energy on the life style of every citizen of this country. The international "oil boycott" of a few months ago, has given cause for concern and re-assessment of the basic policies relating to energy use and abuse.

The power engineer is the "key" person in the area of energy conservation. In the United States, more than one million strong, the power engineer controls more energy use through operation of industrial and utility power plants, heating plants in industry, buildings and school complexes than all the rest of the world put together. Whether you are associated with a large building complex, an industrial facility, a business center, a small business, or an individual building, one person (whatever you call him), the power engineer is the only person who can ultimately provide true conservation of energy. The power engineer, whether called a building engineer, heat and power man, custodian, chief engineer, stationary engineer, fireman, boiler operator, or other, is the person with the hand on the "energy switch" or control. Unless the operating practices for a particular system are examined in the light of the power engineer's connection to the operation and maintenance of this system, the results will be less than satisfactory in terms of energy saved.

With these comments in mind concerning the role of the power engineer in attaining efficient energy use for buildings, let's now take a look at some of the areas in which the greatest energy savings can be realized when managing buildings, building complexes, and plants. This list is not intended to be comprehensive, but only offer suggestions and recommendations for those desiring to survey their programs initially to institute an energy conservation program. If we were to comprehensively consider all the ramifications of energy conservation and its relation to the power engineer, a forum of several conferences such as this one would still be inadequate.

For purposes of directing our attention to the issue of building energy use, let's take each of the following items separately:

1. Planning effective energy utilization through initial design and construction of facilities or modification of existing facilities.

2. The power engineer and effective energy utilization practices.

3. The power engineer and effective energy utilization through timely and proper maintenance.

Considerations in each of the three areas will provide insights into the planning necessary for a sound and effective building energy conservation plan.

Planning effective energy utilization through construction and modification.

The concepts of total systems responsibility, and value engineering perhaps play the most important part in the design and construction or modification of energy systems for buildings. Many times, specifications do not include the identification of total costs over the full life cycle of the projected system. Without these, adequate energy management cannot be projected and pro-

vided for during the operating period.

a. When constructing or modifying structures or plants, employ contracting firms for the total project to allow for full planning over the full life cycle of the system and providing for all possible problems relating to energy conservation. Total systems responsibility must include:

1) Initial structure and mechanical systems planning.
2) Operational plan during the life of the system including costs related to one plan over others.
3) Maintenance costs projections over the the total life cycle of the system.
4) Replacement cost projections during the life cycle of the system.
5) Specific energy conservation programming built into every part of the system and structure.
6) Specific attention to regulatory requirements both those in force and those projected.
7) Comprehensive preventive maintenance program planning from the design board.

b. Value engineering and energy engineering concepts provided as normal parts of the total system when constructing or modification takes place. Included in this area should be as many acceptable engineering practices as possible to provide and efficient energy consuming building. Some of these might be:

1) Maximum utilization of latest technologies such as:

   a) Solar systems.

   b) Heat pump systems.

   c) Heat recovery apparatus for condensate and exhaust systems for air conditioning.

   d) Fuel purchasing plans over long periods where possible.

   e) Flexible equipment purchase such as for multiple fuel applications.

   f) Energy savings equipment including:

      Cooling economizer operations

      Night set-back controls

      Central system control and monitoring

2) Careful selection of equipment through provision of alternatives by the engineer and architect based on total life cycle rather than installation to meet specific needs for a building.

The Power Engineer and effective energy utilization practices.

Many things contribute to total programs relating to energy conservation in buildings and plants. To have effective programs, planning must take place, responsibilities must be assigned, follow-up inspections must be made, records must be instituted and maintained and efficient operating practices must be identified and implemented. The power engineer is the only person who can accomplish all thesethings, and help must be provided to make this job simple and effective. To this end, the following items require priority attention:

a. Know the equipment and systems: Provide each power engineer with the best information each manufacturer has to offer on the equipment by insisting

upon delivery with the equipment of an adequate number of sets of operating instructions, application instructions, and service and maintenance instructions relating to each piece of equipment.

b. Provide incentives for training of power engineers: Insist that installation vendors provide initial training on every type of equipment they install. Pay the engineer for attendance at sessions with new equipment vendors and sessions with vendors of old equipment to update their skills on making the equipment operate properly and efficiently.

c. Insist on licensed operating staff: Power engineers with licenses have demonstrated competencies through taking license examinations which are aimed at requiring extensive study by the power engineer before passing them. In addition, experience is necessary prior to taking each level of examination and further identifies the individual who would be most qualified for operating a building or plant. Incentives are built into the program of licensing by allowing progression from license class to license class.

d. Make special tools and instruments available: It would be pretty difficult for the power engineer to check boiler efficiency, to test, balance and adjust a forced air system or to balance a hydronic system if the proper instruments with the level of precision necessary were not available. It is easy to see that even though the air meter may cost up to $400.00 for the initial purchase, that over a five year period, it would pay for itself in energy savings for forced air adjustment, if not in fuel savings, then in service calls alone in less than tnat time.

e. Have written operating practices which require efficient operation: To obtain maximum benefit from any energy conservation program, checks, adjustments,

recording operating activities and actual operation must only be accomplished by personnel fully qualified to do them. Definite limits must be established and maintained to insure that adequate attention is directed consistantly to each energy saving process. Some of these for buildings and plants are identified below:

1) Boilers, furnaces and heating equipment: (To save up to 25%)

a) Daily check burners and fuel systems for proper operation and fuel consumptions. Maintain within acceptable limits.

b) Analyze flue gases for proper CO_2 content at regular intervals to insure proper combustion and excess air.

c) Maintain proper stack temperatures, and a close watch on any rise in stack temperature which might indicate fouling of heat transfer surfaces by scale or soot.

d) Clean fuel filters ar regular intervals to prevent flameouts and possible furnace explosions.

e) Maintain adequate combustion air supply, both to the furnace and to the boiler room from outside to prevent "starving" boilers for air and the resulting loss in fuel heating value from insufficient air.

f) Keep all heat transfer surfaces clean.

g) Maintain a boiler log on the efficiency of the boiler or boilers by checking inputs against outputs of each unit. This will also provide information on potential problems as they arise, and before the become problems.

2) Electrical System: (To save up to 10%)

a) Check power factor and incoming voltages at all times of the day and night using a recorder if possible. A low power factor results in wasted

energy. Low voltage will result in excessive energy use and possibly burned out motors with a resulting high replacement bill.

b) Check electrical contacts - Change if bad. Poor contacts on larger equipment increases circuit resistance and results in energy losses.

c) Keep lights and fixtures clean - lighting efficiency is drastically reduced with even the slightest dust cover.

d) Provide for regular lubrication of all electrical equipment.

e) Reduce decorative display lighting.

f) Institute a campaign for putting out lights in unoccupied rooms being emphatic upon all users to follow this policy.

3) Air Conditioning Systems: (To save up to 15%)

a) Maintain the temperature difference for cooling according to the outside air temperature rather than establish an arbitrary level of 75°F. Occupants will feel just as cool as long as building temperatures are less than those outside. (Example: Maintain an indoor-outdoor differential of 5-10°, making inside temperature of 80°F with an outdoor temperature of 85°F)

b) Reduce "reheat energy" by allowing higher evaporator temperatures which will provide better humidity control and less loading on the cooling system.

c) Reduce to 15-20%, the outside make-up air introduced into the system for total comfort, resulting in less heating and less cooling necessary.

d) Utilize an economizer cooling system in the seasonal change period to avoid operation of the cooling system prematurely or during cool evenings to minimize the load on the cooling system.

e) Reduce lighting levels in non-working areas in the summer to cut down on added heat loads.

f) Use draperies, shades and awnings to keep out direct rays of the sun and mid-day heat.

g) Consider adding insulation to walls, ceiling, air ducts and chilled water lines.

h) Shut off motors, office equipment and other energy consuming equipment when not in use - these items add much to the heat load of the building making the cooling system work harder to remove it.

i) Shut down supporting equipment such as ventilating fans, chill water pumps, condenser water pumps, cooling tower pumps, exhaust fans, and others whenever possible.

j) Isolate those areas and rooms that are unoccupied to omit temperature and humidity control whenever possible.

k) Install heat wheel to recover heat from exhaust systems when possible, and to precool the make-up air with the exhaust air.

l) Purge non-condensables from cooling system to maintain lowest possible operating pressures and lowest energy using levels.

m) Carefully control water treatment and blowdown to prevent corrosion and excessive make-up.

n) Regluate air volumes by changing fan speeds rather than throttling down on air dampers to restrict air flow.

The power engineer and effective energy utilization through maintenance.

Maintenance procedures can make or break an energy conservation program for a building or plant. Without effective and consistent maintenance, all efforts for savings through energy conservation maight be eliminated with one major equipment replacement.

The power engineer must be trained in proper maintenance procedures. And, preventive maintenance programs are a must in every building or plant. The following major elements must be incorporated in building plans for effective energy utilization and conservation:

a. Operating staff trained and oriented to daily maintenance.

b. Major equipment maintenance must take prime attention of the power engineer operating staff.

c. Records (logs, lube schedules, equipment maintenance sheets, etc) must be included in an effective maintenance plan.

d) Projections on future repairs, and replacements must be found in preventive maintenance plan.

e) Regular maintenance schedules must be followed to insure the projected energy savings through maintenance.

Summary

Energy conservation for buildings and plants is a worth goal of all administrators, owners and operators. Sound and effective management policies for efficient energy utilization include considerations in design, construction, operating staff and implementation of adequate operation and maintenance programs. The training of the power engineer is the key to effective energy conservation and efficient energy utilization.

CREDIT THROUGH NONCOLLEGIATE ORGANIZATIONS

John J. McGarraghy
Director, Office on Noncollegiate Sponsored Instruction
New York State Education Department
Albany, New York

We have all been reading and hearing a great deal recently about the fact that the world of education and the world of work are far too isolated from each other. I believe that the Project on Noncollegiate Sponsored Instruction is one way to help bring these two worlds into a more productive relationship by focusing on education in the workplace--a vast enterprise where some 13 million people receive formal instruction each year. What I am going to do here is briefly describe the background of the Project, which is the first such effort at the national and state levels in the United States, explain our evaluation process, and give some examples of the types of courses which have been evaluated thus far.

Background

The Project on Noncollegiate Sponsored Instruction is a joint program of the American Council on Education (ACE) and the New York State Education Department (New York), which began in the summer of 1974. It was started with the financial support of the Carnegie Corporation and the Fund for the

Improvement of Postsecondary Education. The purpose of the Project is to review formal educational programs and courses sponsored by noncollegiate organizations and to make appropriate credit recommendations for the courses evaluated. These organizations, whose primary function is not education, include business and industry, labor unions, professional and voluntary associations, and government agencies. The credit recommendations are intended to guide colleges and universities as they consider awarding credit to persons who have successfully completed noncollegiate sponsored instruction. In this way students will be assisted in receiving academic recognition for the learning gained in the courses.

The Project is based on the position that it is sound educational practice to grant academic credit for quality educational programs conducted by noncollegiate organizations, provided that the courses are at the college level, and that the credit is appropriate to an individual's educational program. Moreover, experience has shown that the award of credit for prior learning will in many cases motivate students to enroll in formal postsecondary programs of study.

The first step in the development of the Project came in New York State in January 1974 when the State Education Department initiated a pilot study. This study adapted the procedures and criteria that ACE has used since 1945 in evaluating formal military courses, and tested their applicability to the review of similar non-military courses. During this preliminary stage, evaluations were made of 102 courses sponsored by eight organizations located in New York State. In the process, credit recommendations were established when 95 of the courses were found to be at the college level, and the components of a model for a national/state review system were identified. The results of the pilot study were published in December 1974 in the first edition of A Guide to Educational Programs in Noncollegiate Organizations.

The second edition of the Guide, the first joint publication of the Project, was issued in February. It reports on over 600 courses sponsored by 38 organizations and conducted throughout the United States. These courses were reviewed during the period November 1974 to October 1975. Our plan is to continually update the Guide and publish it on a regular basis to include new credit recommendations established through the evaluation process. The Guide is made available to colleges and universities and noncollegiate organizations throughout the nation.

The Evaluation Process

The credit recommendations are established through a thorough and objective evaluation process, which I would like to explain. Noncollegiate organizations participate in the Project on a voluntary basis. Each sponsoring organization selects courses for review with the assistance of Project staff. Only educational programs or courses conducted on a formal basis and with official approval of the sponsoring organization are considered for review. Informal training or job experience are not reviewed.

Courses must present what is thought to be college level material. Classroom-based courses conducted over an extended period of time must contain at least 30 hours of instruction; those offered on an intensive basis must be at least 5 days or 35 hours in duration. Such courses must have a prescribed program of instruction and be taught by qualified instructors. We also evaluate correspondence courses--programmed instruction and exam-based programs. All courses must include an appropriate method of evaluating student performance.

Organizations supply the following information for each course submitted for review.

1. A detailed syllabus describing the objectives and content of the course.
2. Instructional materials used (textbooks, audio-visual materials, case studies, etc.)
3. Procedures used for measuring the performance of students in the course and samples of the evaluation procedures.
4. Criteria and procedures by which instructors are selected.
5. Educational background and work experience of the students taking the course.
6. Duration of the course.

Each organization also supplied information on the administration of its educational activities, including an explanation of procedures for course development and revision, of procedures for record keeping and reporting, and of controls to insure uniformity of quality and course content when a course is offered in several locations.

Review teams are normally composed of three persons who are selected from college and university faculties and from noncollegiate organizations. They are selected on the basis of their knowledge and experience in the subject area of the courses to be reviewed.

Review sessions are usually conducted at the location of the organization offering the courses. Organizational staff members familiar with the courses are available to answer questions that may arise during the review of course materials. After a thorough review of all the information and materials supplied by the organization, the team members first decide if a course is at the college level. If it is, they then determine the category of credit, the number of credit hours, and the appropriate subject area or areas to recommend. Whenever the team establishes a credit recommendation for a course, it has determined that the method of assessment is adequate to judge that students successfully completing the course have mastered the subject matter.

In other cases, the team may recommend that no academic credit be granted. Reasons given for failure to recommend credit have included: 1) the course is too limited in scope or too highly technical to be comparable to college programs; 2) the material presented in the course is not at the college level; 3) adequate evaluation of student performance is lacking; and 4) insufficient material is presented on which to base a judgment. Courses for which credit recommendations are not made are not listed in the Guide, but we will supply this information to colleges upon request.

Examples of Programs Evaluated

Let me give you a few examples of courses and programs for which credit recommendations have been made. The examples have been chosen with your interests in mind, but you should be aware that we have evaluated courses covering a wide range of subject areas.

The Federal Aviation Administration's Airway Facilities Service conducts an extensive training program for electronics technicians. The required training progression, which leads to full performance or certification capability on designated types of equipment, generally includes a combination of full-time courses at the FAA Academy in Oklahoma, directed study courses completed under supervision of local personnel, and on-the-job training. All technical training programs are conducted according to nationally prescribed standards. Of the more than 80 courses evaluated which received credit recommendations, 20 courses received recommendations in Engineering Technology at either the upper- or lower-division baccalaureate level. These include courses in radar, navigational aids, environmental support, and communications. Since many of the technicians are interested in pursuing baccalaureate degrees, the credit recommendations will serve a large number of FAA employees throughout the country.

In the case of the Port Authority of New York and New Jersey we evaluated three apprentice training programs, along with a variety of other kinds of courses. They were an Automotive Apprentice Training Program, an Electrical Apprentice Training Program, and a Stationary Engineer Training Program. All of these programs are designed to prepare entrance level personnel and high school recruits for employment within the Port Authority in the particular skills area. Selection for the programs is on the basis of performance in competitive examinations; applicants must also have high school diplomas. Once selected, trainees are required to participate in an intensive four-year program combining classroom and shop-related instruction with on-the-job training. If a trainee does not maintain a satisfactory rating in his work performance and instructional training at any time during the four-year period, he is dropped from the program. The three programs were found to be of high quality by our evaluators, and the credit recommendations for each overall program were fairly significant.

in which we're heavily involved and a design of experiments, statistics and things of that sort.

It's interesting that John McGarraghy spoke before me today because the fundamentals of computer programming is one of the courses that we submitted for approval under his non-collegiate program a year or so ago. The design of experiment, sequence, this goes not only from basic statistics but also goes on into the design of experiments and is essentially a two year program for those who need all of that which some of our technical, scientific and research people do. The one which probably comes closest to some of your interests, and is a very important part of our operation since 1966, is our vocational training section. You might be surprised to know that we have about 350 apprentices and about 11 different skilled trades in our plant. The reason for this is to insure this kind of qualified tradesman and by getting people from high school, putting them to work about 36 hours a week, and having them in class about 4 hours a week for three years, they will become skilled tradesmen. It may not be obvious as to why we need these people, but let me describe to you in very brief terms the fact that you don't go out and buy photographic equipment without knowing when to buy it. There is no where near extensively as far reaching as the areas in which the Kodak Company has become involved over the years. So it is difficult to go and buy a coating machine, a slitting machine, or a perforating machine for film or paper. These are designed by our engineering people, they are built by our shop people, and they are maintained by our maintenance division. That's where our apprentices work, in the shops, maintenance, and now also in our construction division because we do build some of our own buildings as well as our machinery.

So 11 trades, 3 years, 160 hours per year these young men are in class. Lists of the trades are available, mostly through the Kodak Apparatus Division - KAD. The Kodak Apparatus Division has unique needs for those particular skilled

on which to base credit awards, with considerable savings of time and money to the institutions. And what's equally important, people who take these courses are beginning to receive college credit based on our published recommendations.

In the future the Project will continue to expand its evaluation system and more widely disseminate information about its activities in order to foster increased cooperation between work and education and to broaden educational options for all students. In this process we welcome your advice and support and involvement. Thank you.

"UPGRADING EMPLOYEES FOR FUTURE PRODUCTIVITY"

Dr. Richard Edgerton
Director of Training
Kodak Park
Rochester, New York

I have a staff of 55 full time instructors and about 20 supporting people laboratory assistants, secretarial people, and clerical. So it's a several million dollar operation. In addition to that we administer our Kodak Park tuition aid program which is another couple million dollars each year. In a technical plant like ours, which also includes our central research laboratory, adjacent to the Kodak Park but reporting through corporate management rather than Kodak Park management, makes it necessary for us to provide some rather wide range of on-going programs. Many of our people are technical or technicians by background and training, but we don't feel that it can stop there, but when they come with us their fields move on and if there are areas that they need to know to do their present job. I emphasize that because all of our training is devoted to helping a person do his present job better. The reason for our existence is to do just that and it is done on company time. What kind of classes do we offer people? Or offer their supervisors? In all cases the supervisor approves a man coming to one of our classes. The man may express the interest but it must be a joint agreement between the man and his supervisor that at this point in time he needs this particular training. Let's just take a look at what our in-house capabilities are. We have management training or supervisory training which ever term you wish to use, and one of the most important courses for our people is the course we call basic training for supervisors. A man appointed a supervisor has new responsiblites over what he had as a worker. We feel it's important he has some basic training which we provide in a series of 19, 3 hour sessions. They are

held twice a week. Another typical program which in business and industry academia as well I'm sure. We hold conferences. I'm sure you would agree with me that there is also a lot of wasted time, and many times very little accomplished in many of the conferences that we're asked to attend. We have a program in which we try to improve the effectiveness of people who are leading and participating in conferences, as one example, I've only tried to pick a few to give you a feel as to the areas we cover.

In this management training area we probably have forty different courses which are not offered all the time, but are available on request from the plant. We have another and I would like to just show you some of the topics that are covered in this basic training for supervisors. Topics covered are: communications, the human side of the manager's job, problem solving, course company policies and procedures, standard practices, guides to administrative competence, just to name a few without a lot of the details. Being in the photographic field, many of our people are not knowledgeable in photography, including our scientific people, their chemists, their engineers, their mathematicians, their physicists, and biologists but their expertise in photography is many times lacking, so we do have a series of photographic training courses. One in which people become familiar with just the operation of a camera, and the making of black and white and/or color prints, processing the film and making color prints. Then a more technical program is the theory of color photography which is really a course in the chemistry and physics of photography, if you will. Some of you are familiar with that field. We use a book by Evans, Hansen and Brewers.

One of the topics that are covered in the course are theory of color photography. Included in the instruction are the characteristics and differences of color photography, how they work, and some of the films that other people make. We have another group which is called professional training, for lack of not really a better name but a more descriptive name. It includes computer training

The New York Telephone Company has developed courses in many different areas to provide employees with an opportunity to receive appropriate training at various intervals in their careers. A number of the courses evaluated thus far focus on developing technical skills that are most relevant to the job being performed. A number of these courses involve individualized instruction. These technical courses received various credit recommendations in such areas as Electrical Construction and Maintenance, Industrial or Electromechanical Technology, Basic Electronics, Digital Electronics, Computer Technology, and Computer Applications in Engineering or Industrial Technology. The great majority of the employees who take these courses do not have college degrees, and the credit they receive for the learning gained in these courses may well motivate them to enroll in collegiate programs of study.

Summary

Over the past two years the Project has made substantial progress in evaluating various types of courses from a wide range of organizations. In addition, a sound and workable set of criteria and procedures has been developed for the evaluation system. As a result, the recommendations which are found in our Guide provide colleges and universities with reliable standards

trades which we at Kodak Park do not. And because we have the majority of the people, we have their people in class. On the job training is also done in the classrooms here in Rochester.

The requirements for apprentices, of course, are fairly straight forward. They should be and we hope they would be high school graduates or certainly the equivalent of a high school graduate, and particularly strong in math and physics because those are the basic tools they need to be successful in an apprentice program, and any of the skilled trades in varying degrees. Some require more than others, of course, but generally a good basic background in math through algebra, and hopefully trig, a good basic program in physics in high school and some practical experience. Many of the men who have that kind of background experience are from the rural areas, because they have worked around machinery and farm equipment as opposed to the city boys generally who haven't been exposed to that practical experience. So we're looking for good qualified high school graduates each year to staff and to maintain our apprentice program.

The technician program is one in which we take two year people. In the course of two years rather than three we fill in some of the blanks in their training. In other words we'll take and A.A.S. mechanical or electrical tech. person and fill them in on some things that perhaps they did not have in their regular two year program. We find, and they find, this to be useful in doing that kind of work.

To give you an idea of what our people do and what our capabilites are available through Kodak. You may be familiar with some of our on-going programs. For example, MIT, the center for Advanced Engineering Study, has prepared some excellent calculus revisited programs. The first time we had these at the plant some one asked how can you revisit a place you've never been. Even though they have been there years ago, in college, and they thought they knew calculus. They may have never used it, so it had gotten rather rusty. For some of the

advanced engineering programs as you know today, good working knowledge of calculus is almost a must. That's what MIT found with some of the people who are going to their center for advanced engineering study. Calculus was one of the tools that was sorely needed. It's a combination of film programs, work books, and text books. It can be a self-study or monitored program. You can also have a subject matter expert come in and answer questions occasionally.

Cowide and surface chemistry is another program. It's interesting how MIT got into this. They had a visiting professor from the University of Utrek who is a world renowned physical surface chemist. While he was at MIT they asked him to develop this program. I think there are about 4 sections now that are available. This is on video tape rather than on film, I might add.

Some of the other programs that we've done locally, and this runs quite a gamut, include scientific Russian and scientific French. These are the influence of our research laboratory people who have found the need for them. In addition machinery dynamics, automatic control systems programs. Our engineering people are also interested in transport phenomenon. These are not on-going now, but could be requested if there was a need again.

Electronics for scientists, though is one that we have been conducting first at the University of Rochester and more recently down at our facilities at Kodak Park. This is really a program to familiarize chemists with some of the sophisticated testing equipment that has evolved in the last 50 years. They don't repair them, but that they ought to understand them. They have some concept of it, and in order that research people are needed who have more background in basis electronic circuitry.

Another one which we have used for the last 3 years and had very good reception at RIT is the preparation of the program called Introduction to Palmer Science. The American Chemical Society has a series of related programs in the

field of Palmer's, but in looking at those carefully with some our scientific people they didn't feel as though they quite did what they wanted and so with Doctor Wallace, Dean of the College of Science at RIT, we developed a program.

Something I think would be of interest to you is credit toward and A.S. degree for Electrical Apprentices. Electrician apprentices, of course, is one of those areas that we are much interested in. Several years ago, with RIT, we worked out a scheme whereby for certain of our apprentice courses, RIT would recognize as credit toward the A.S. degree. A total of 30 hours out of the 3 year program was included in classroom instruction for apprentices. If they took an exam that RIT would prepare and successfully complete it, they would get college credit for that course. We did have one young man who got all 30 hours of credit. Others got as few as 2 hours of credit. It is an opportunity that while they were going through the apprentice program, they received credit for this, similar to what John McGarragy mentioned.

We use T.V. courses extensively both those at RIT, and the engineering program. You probably have see in the catalog one which is listed out of Denver, Colorado. Another one called Jeneske in California lists a great variety of T.V. courses offered by various schools and colleges. Kodak Apparatus Division has used the RIT Engineering Programs rather extensively because of the availability of people for the program and their unique vocation.

Another program which we worked with at the A.S. level with RIT several years ago was the Cam Tech program which I'm sure many of you are familiar with. It is still conducted at RIT and across the country for training technicians in Chemical Technology. This one is designed around the ACS Program that was developed several years ago. The Cam Tech Program with the accompanying text books were prepared by a team of people from many colleges across the country at the University of California.

Just a few more things here to complete the miscellaneous kind of things that we get into, such as continuing education opportunities for our people.

You may be familiar with one on Statistics and Problem Solving and Decision Making by J.S. Hunter. This is a series of film lectures and Advanced Systems Program. Advanced Systems, Inc. is a company which has put together video lectures. We have used those rather extensively as a special lecture series offered at our Research Laboratories on certain topics of special interest to our scientific people. About 4 times a year we bring into the plant live lectures. There is one being offered right now on the principles of color technology by Bill Meyer from RPI. This is a package course. We also have available some of the audio and film courses that are available from the American Chemical Society. We have a series of Kepner-Triegel seminars, which is a franchise program. Kepner-Triegel, put together a rather interesting one week program on Problem Solving and Decision Making. If you have one of your people trained by them you have the opportunity of putting these programs on within your own plant. We've been doing that for about the last 3 years at Kodak Park and with promising results.

The other large area of activity which I've not touched upon at all because it's really done outside our operations, is the Tuition Aid Program in which we encourage our people to take at local schools and colleges. It is administered by our Training Department and we counsel with people with programs they might be interested in.

"UPGRADING EMPLOYEES FOR FUTURE PRODUCTIVITY"

Marion G. Wood
Manager For National Service Training
Xerox Corporation
Rochester, New York

As I thought about our respective roles in technical education, you as the producers and we as the consumers of skilled labor in industry, a couple of thoughts I would like to share with you. First of all is that your role as the supplier has become significantly more important to industry with the advent of the volunteer army, because we can no longer rely upon the military as a significant source of technically skilled labor. And, secondly the need for technically skilled labor in industry is continuing to grow, and I just wondered if you ever had a sense of power in that I feel a little like an oil consuming nation addressing OPEK today. Your ability to meet industries needs in the future could be a key factor in the ability of many of the technologically based industries to sustain their growth. Your theme for this clinic is one which is of particular interest to me; technical education, key to productivity in 1976, is a theme which I suspect will apply not only to 1976 but well beyond the foresight of most of us here today. At Xerox as well as with the rest of the nation we have become increasingly aware of the importance of improving the productivity of all of our systems and employees, the state of the economy and the increasing competitive activity have only added to the already significant demand for good business practice.

As manager of service education I started to search for a methodology by which I could optimize Xerox's considerable commitment in resources to training.

We found no such standard approach or methodology which met our need. We have however, adapted some of the techniques in disciplines used in industry to the training environment. Our engineering and manufacturing and marketing counterparts have understood the value of a systematic and cost effective technique for delivering a product to a customer for quite some time. Each step in the business cycle, is taken deliberately, the results measured and the value added assessed. Entire disciplines have been built around quality control to assure delivery of products which meet specified characteristics. Professions in accounting, finance, and control have developed in response to corporations drive to control cost. Specific indicators of productivity such as unit cost have developed. Investor inventories are carefully controlled to prevent losses in production, expense, and unused product deterioration. Many of the concepts used to manage other functions of a business can be applied to the training function. Market research closely parrells a training needs analysis. Both strive to identify user requirements. Design and development, closely resembles the task analysis, course specification, and curriculum development activities. Production is similar to training to the extent that both produce measurable units to which cost and quality characteristics can be attached and measured. Quality of output can be counted and controlled. The ultimate test of the output of either system is determined by how well it performs in the environment for which it was designed. Xerox is applying many of the general business practices to the design, development, and control of its service education function. Our product is the technical representative who can interface effectively the Xerox customers and products.

Interface which explains in more detail our development cycle and then we will continue with the business practice. Interface expresses the considerable commitment that we have made to professional training program development, documentation, job aid support, on which we rely so heavily at Xerox to make

our service efficient. We dealt with our significant commitment to our training facility at Leesburg. I don't know how many of you are familiar with that facility but it is on 2,000 acres on the Potomac River near Leesburg, Virginia and houses about 1,100 students. It is here we conduct our training. At the conclusion of that particular session, I was to have completed the portion that was adjacent to the design, development, and curriculum development area and the training area and then I wanted to talk to you about the controls which we felt were important from a business aspect to the effective management of a training function. To assure that service education function is carried out effectively, we've established quality standards and measurement techniques. Our performance standards are stated as a percent of accurate diagnosis of repair of field problems within a specified time. Separate standards are set for newly hired technical representatives who will undergo additional OJT and for already experienced personnel who are being cross-trained into other products. Extensive testing is performed throughout the training cycle to assure the students meet the standards specified. Establishing a quality baseline, we feel, is crucial if rigorous cost controls are to be implemented in the training cycle. Within the quality baseline established, effective cost reduction alternatives are assessed and tested, to optimize the cost effectiveness of our training systems. Unit student cost is determined for each course. Current practice is projected, as a cost item. Alternatives to reduce the unit cost are evaluated, the value of lost productive hours while in training is always considered. Strategies are developed which minimize student days lost to productive work taskes. Quality standards, however, are never set as a result of the student day cost and therein lies the trap that we must be continually aware of in running training more like a business.

The temptation is great to drive costs down for the training cycle at the expense of the ability of the man to perform and we recognize exactly how short-

sighted that process can become. The total value then of the productivity added is calculated for each alternative considered, including the increase service productivity, decrease training duration and reduced training cost.

Three endicies of profit ability are utilized in selecting the most profitable alternative. The net present value of the alternative is identified, the rate of return is quoted, and a volume indicator such as student output is identified. If these indicators are sufficiently positive the alternative is considered further, and often adopted. Controlling quantity trained or inventory is as important for a training function as for manufacturing. A necessary investment in trained personnel is identical in principle to providing a needed inventory, it is perhaps even more important that producing surplus inventory in that employees were lost to their productive assignments while undergoing training. Training contribution to productivity at Xerox consists of delivering of a motivated employee in the exact number required at the lowest cost at a specified level of competence.

PRODUCTIVITY IN THE HEALTH SCIENCES

Mary Pat Pennell
Assistant Dean, Health Services
Monroe Community College
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Productivity in health is a pretty new idea for us so we really don't know very much about it. We talk about it over coffee and things like that but we really don't know much because we really never had to deal with productivity. It's sort of what Lola wants, Lola gets and always we try to do that because there's something about life that's a little bit different from everything else that we deal with, like a product. Historicaly we have always looked at the health care business as a sort of sacred mission. It's not an industry, it is a sacred endowment and if you will recall in the pre-christian era, there were health spas all over the entire civilized world which took care of the rich largely. The poor had to kind of fend for themselves. By the time we got to the middle ages, we had hospitals, but these were usually run by nuns and designed exclusively for the poor. The rich had the private physicians, you can remember in history there's all kind of guys that were related to Charles the I, the 10th or whatever it was so we go in pretty much a full circle again except this time around at least, history will look back and say they have got both ideas together for a change. What will happen in the future, who knows.

When we talk about productivity, we are invariably talking about money. It's just simply a question of costs. Whether its goods or services it's still money. Now sometimes they go up together, costs go up, productivity. Sometimes they go down, and sometimes they go in opposite directions, but no matter how you look at it, what we're talking about is just cost. What we want, of course, is very very high qualities for the least amount of money.

Now in health we deal with the delivery of a service not goods. When you start dealing with services the thing that is going to cost you the most is obviously personnel. Any hospital will tell you that between 80 and 90% of their budget goes for personnel. We are dealing with the service. A service is a rather intangible thing and it is extremely difficult to measure. We're talking about measuring the quality of it. I suppose that one way we might increase productivity in the delivery of health care would be diminishing the number of people who provide it. But it seems to me that if we do that without some other adjustments as Lou mentioned taking place then we're going to end up decreasing quality simultaneously, or on the other end of the scale we can decrease the services. If we decrease services obviously we don't need as many people and therefore the costs go down. Now, can we get along without the services? I don't really know that. Of course, as Lou pointed out as all of you know, the way health professionals practice their profession is absolutely dependent on the way the medical and dental community practice their profession. Diabetes for example is one of the cleverist disease to treat. There must be at least 11 or 12 major ways to attack the thing. All of them have insulin involved, but there are a whole bunch of other things that can be done. Here in Rochester, we like insulin, bi carb, a little sugar, a little potassium. In other places they want insulin and water. So depending on how we teach our people to practice the care of the diabetic, for example, depends on what the medical community is going to do when they are teaching. It's only been in the last, well perhaps two decades certainly no more than 25 years, that we have seen this tremendous change in health care. Up until that time there were little bitty incremental increases in quality and care and delivery service but in the last 20-25 years they have been tremendous and we have two major reasons, at least I think there are two major reasons for why this has occurred. One has been the obvious explosive growth in medical technology, and that's been

due to two inventions. One is solid state electronics and the other one is plastics. Now if you wipe those out of medical care we'd be right back about 1947-48. And the other thing that has increased tremendously in the last two decades and certainly in the last decade is the incident of malpractice suits. That just means we don't trust what he tells us any more or what he does to us and so when we don't like the outcome of the treatment we tend to slap a law suit on him. Now a days every single patient that enters a health care institution, whether it's one of your neighborhood health centers or the local hospital is subjected to a great deal of proding and poking and pushing and examining and measuring and you're hooked up to tubes and electrodes and one darn fool thing and another that 25 years ago we couldn't have even dreamed about. We can x-ray you inside and out, upside down, we can do programs of you, we can locate tumer by heat radiation we can do a whole bunch of neat things that we couldn't do 25 years ago. But if you want them done you've got to pay for them. I'm not at all sure that all of the increase in our medical technology has changed the health of the nation that much. Now it has treated our insecurity. I'll tell you that because I'm telling you if you can look at a laboratory report and say that there is the potassium and there is the sodium and has all of these other things listed that gives you a great deal of security. If you've got 5 x-rays, you're secure. You haven't diagnoised the case, you haven't even begun to treat the thing but you feel a lot more secure. But all that stuff costs you a whole bunch of money. Part of this, as we said earlier, is law suits. And a lot of the things that are done that increase the cost have simply been done for the physician and the dentist to protect himself against some sort of legal action down the road.

You've got all of these problems, Now, how are you going to increase productivity? I don't know, I really don't know. First of all the medical community has got to change it's way of doing things. And I'm not using this to throw

rocks but as Lou pointed out we're dependent on what they do. Of course, in education we can do a couple of things, and of course, the cost of medical care is going to get back on us one way or the other. We can use our clinical facilities better than we are currently using them. One way of doing this might be to better prepare the student on campus before he gets to the clinical facility. Very often we are giving the basic biology, chemistry, and so forth and then we throw it in a clinical facility and say OK here we go. In other words, it's the old apprenticeship approach. We might do a better job on campus before we go and use up patient dollars as it were in the clinical facility.

This coming year in our lab tech program this is exactly what we are doing. We're revamping it entirely to do a better job on the campus before we get them in the hospital. See me in three years and I'll let you know if it worked. We also might go for a higher student - instructor ratio. OK fine. No argument that might be a good way to do it except you've got a few problems. One you have life insurance certification regulations that say 6 to 1, 10 to 1, 5 to 1, 2 to 1, 1 to 1 or whatever it is. You mess up those things, there go your accreditation. Without the accreditation you can't take the license exam, without that you can't practice the profession so there you are stuck with that.

I don't believe that one nurse can look after 20 student nurses. I don't think she can run that fast. I know that one lab tech can't watch 15 lab tech students if they are all in for a different reason. He can't even see them, how will he know what they are doing. So student and instructor ratio, I don't know. That is going to be a problem to deal with and I'm not at all sure that we can reduce it or increase the ratio, if you like to reduce the number of instructors needed very much and still maintain the quality that we have.

I don't know what the rest of you all experience in attrition rates but ours are absolutely horrendous. Any college that operates under the open door policy, referred to by some of us as the revolving door policy, has the problem. Now

you can make your selective procedures much more stringent if you like but then what do you do about the kinds who really are motivated and have the energy and that sort of stuff but they lack the skills. Well of course we have an answer. We have developmental studies. Well how do you separate the two, where do you put them, and who pays for developmental studies? The end result is that it will increase the cost of medicine because it not takes a nurse 4 years to get through instead of two, so I'm not sure that this is going to help matters. Of course, on the job once you are out working as a practicing health professional the biggest thing that we can do to reduce that 10 to 20% is to reduce the number of errors that we make. Almost all of the measurements sciences in medicine have a program that they call quality control, quality assurance or something like that. What it means is that when you get the answer out the probability is that between 94 and 98% of the time it's going to be right. If you have to repeat a number of x-rays because you can't remember what the setting is, every piece of film costs you some money. If you screw up on a laboratory test and you have to throw that one out and start all over from scratch that costs you money. So one of the things that we might teach our students is to try not to make a mess Charlie. These kids grew up in a throw away society, they don't understand that there is such a thing as scarcity because the've never been exposed to it. They should have lived through World War II where the only way you got a new tube of tooth paste was to bring the old tube back; and you guys that were shaving, I think you had to turn in a razor blade to get a new one, or something like that. Well, they've never lived through this, so to them an error or something that is messed up, doesn't mean anything, because it doesn't come out of their pocket. There is always another bottle of it on the shelf. Convenience in medicine is exactly the same as convenience in the food industry and in anything else. We have pre-sterilized throw away IV tubing, etc. We have pre-packaged this and pre-packaged that,

90% of the glassware used in the laboratory is throw away. Here in Rochester we save all our film, because Kodak reclaims the silver and I presume that people do that in other places. But there was a time when they did not do that, they just flung the films away and there went a whole bunch of very valuable chemicals that might have been reclaimed. All of these things are just going to add up in cost and we are going to have to deal with them sooner or later.

We also need to worry about better use of our institutional facilities cause that is where the major costs are. We don't need to admit somebody for a one and a half to two day stay in an accute care facility for a routine check-up and by golly we're still doing it, particularly if the patient has insurance to pay for it, so in he comes. I asked one administrator here and he says it's costing him about $90.00 a day per bed patient. Now, I don't think any insurance covers that, that's a semi-private room, it may be different in other places, that was one institution. Another thing, we don't have is enough nursing home beds to put patients who requre minimal care, but really don't require the acute care facility. So in many hospitals there they sit for months on end in an acute care facility when there are other areas. All of you have experienced this. I'm not telling you anything you don't already know. The whole thing looks rather bleak to me. This is something new for us to deal with, and I don't have any answers for it, because I don't know what value you put on human life. I don't know what price we are willing to pay for help. Sometimes, there are items you have to deal with that are non-measurable, and to me these items are non-measurable. I can't put a dollar value on them, particularly if you are talking about my life, I can't. As Lou said medicine is non-competitive. You know the big hassles that are going on now, should the doctors advertise, why not? If I can get my penicillin for $3.50 instead of five bucks that's where I'm going. You go buy a new car you haggle over price. If you don't like what one dealer

gives you, you go check another one. Like medicine, you want a shot of penicillin, you pay the going rate, and that's just it. You get a new refrigerator, you check four or five appliance dealers, the guy that gives you the best deal, the most service, going to knock a little off because of the paint chip. Or maybe you can pick up something that still works, serves your purpose, great, you want an appendectomy, no competition, whatever the going rate is, you're going to pay it or you won't get the appendectomy. And again, this medicine for everyone, the Dole system, its destroyed two or three civilizations. If we keep it up it will eventually destroy us. Am I left wing of right wing, I keep forgetting? I know it's one side or the other, it's not running the middle of the road.

The public till is going to get rapidly emptied if we just keep on with willy nilly throwing things out. You know what happens. You read the papers, there it is, you've got graft and corruption and abuse and misuse and you eventually end up with a kind of mediocre sort of care, because nobody really cares any more. It's not my money, I'm not getting any credit for it, if you haven't seen this in practicing of your various professions then you must be back in the business office someplace, cause you can really see it when you're out in the working world

The thing I think that annoys me the most is that we abdicate our personal responsibilities for our own help. I am bad enough, goodness knows, but the world's worst are parents with young children whom every time Johnny sneezes or feels warm rushes him to the pediatrician and in about three quarters of the cases if you leave the kid alone a couple of hours he's going to be OK. He gets a stomach ache, you immediately think that it's a tumor or perpherated ulser or something equally worse that you read about in readers' digest and it's a big problem. He talkes about the difference between a sprained ankle and a broken

one, sure you can be taught to do this and there are some radical physicians out there actually abdicating that you do that. AMA is looking at them with a great deal of disfavor, but with any luck, maybe they will hang on. Remember the American Cancer Society came out about 10 or 11 years ago with the breast exam, the self breast exam. Remember the furor that everybody made. You can't examine your own breast, who the heck do you think you are. You can't find a lump that big in them, come on. But they did and now it's an accepted thing. Even physicians, if you're in doubt, now will teach you how to examine your own breast. But in the beginning, well some of them will, I see somebody shaking their head, some of them will, in the beginning say no, we couldn't do that. We're just wonderful. People, we're just great. We just demanded disposable cans and disposable bottles and then turned around and littered the highway and then it cost us millions of dollars to clean them up. We wanted two barrel carburization and a bunch of chrome on the cars and we wanted it to weigh 4 1/2 tons and go a thousand miles an hour and now we can't afford the gas to drive the thing. And just in the last few years, we have demanded new hearts and new limbs and new vessels and new everything except new brains and if we figured they could do that, then we'd demand them too. I wonder where that's going to lead us.

So ladies and gentlemen, I wish I could have answered something. I probably echo most of what you've said and thought and you too sit around and pondificate this over coffee just like I do. Maybe in the long run, maybe all we really have to do is just keep saving lives and stamping out disease. That's our mission.

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PRODUCTIVITY IN THE HEALTH SCIENCES

Louis Albert
Acting Associate Dean of the College
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I'd like to tell you a little bit about Essex Community College and our second speaker probably is now molding Monroe Community College somewhat in that image because the president of Monroe Community College was the founding president of Essex Community College in 1957, but he doesn't have enough influence over here, I can see by the way she is shaking her head to change it. But we are a college that does specialize in Allied Health Programs and thanks to Dr. Koch I think a lot of the preliminary planning allowed us to do this and that it was he who a long time ago, 10-12 years ago, was involved in the planning to bring a 300-bed community teaching hospital and I'll emphasize teaching hospital, and I'll show you why in just a second. The 300-bed community teaching hospital and the only major public health center of the Baltimore County Hospital Department sits on a shared 240 acre campus. We really don't distinguish between the three institutions, in fact, we are now incorporated into one body known as the Health and Education Council, Incorporated. It is the only such campus complex in the country that isn't associated with the university teaching hospital. But our community hospital, soon to expand to 460 beds, does have five residency programs including residencies in family practice, pediatrics, OBGYN surgery, and medicine and because of this extensive influence that the hospital has on the Eastern Baltimore County and Baltimore City region in terms of training a physician, we have been able to do a lot of things in terms of our Allied Health Programs.

In addition to our campus complex, health department, hospital and college, we are only 7 miles to the east of John Hopkins University's medical institutions and do an awful lot of our programs including physician's assisting, nuclear medicine, and several others with the Hopkins Medical Complex. So we have 15

different career and certificate programs in Allied Health. Some of them are the only ones in the country such as our Health Planning Assistant Curriculum. Many of them are the only ones in the state such as Nuclear Medicine or Physician's Assisting and they are complex to say the least, but they have given us an insight which I'd like to bring to you this morning in terms of some aspects of Allied Health Education as I think might bear on this whole subject of productivity.

I am going to read part of my remarks and I am going to speak part of the remarks as I feel necessary, and I am going to try to keep them rather brief because I hope that some of you can stay around for some questions afterwards.

When I was asked to speak on the subject of Productivity in the Health Sciences I had some difficulty in organizing the remarks because if the basic objective of our health care delivery system is to provide better health for our population; the steps needed to carry out this objective are somewhat unclear in terms of productivity. The basic problem is that the traditional measures of productivity are difficult to apply to the health care delivery system. In order to elaborate on this point more fully I would like to take the liberty to state to you this morning a few of the characteristics of our health care delivery system that perhaps ought to be considered by educators when we talk about productivity, and compare the health care delivery system to other industrial models. What I am going to do right now is to speak to you about four very specific characteristics of health care delivery system. I am not going to editorialize, I am simply going to present them to you, and I think that when you think about them, you will see how the subject of productivity has to be viewed in light of these characteristics.

The first is the reimbursement mechanism. Who pays for health care? Although care is ultimately delivered to the individual in need of preventive or curative services, the individual is frequently not directly responsible for paying the bill. Reimbursement for health services occurs in many forms including federal and state

financing of mechanisms such as medicare and medicard, governmental support of public health programs. By that I am referring to such agencies as health departments and other public health agencies; payment from private and non-profit, private, profit and non-profit insurance carriers and other sources with direct payment by the consumer constituting only a small portion of the total reimbursement system in terms of health care delivery system. One of the general themes that I am trying to bring to you this morning is the fact that the consumer is not directly related to the cost of health care as the consumer is when Kodak wants to market a new product. If there is demand for that product, then all kinds of aspects of productivity in terms of the education of technicians, in terms of the efficiency of the plant, etc. are determined by consumer demand. I think that in health care the consumer is indirectly related rather than directly related.

The second aspect of the health care delivery system that must be considered is the fact that the system is contolled by physicians. Although there has been a lot of movement in spite of the fact that there has been efforts in recent years to give increased decision making roles to health care consumers, the fact exists that the basic control over the resources of our health care delivery system still remains in the hands of physicians. It is actually quite inappropriate to speak of consumers of health care in the traditional sense in that consumers really don't determine the specifics of services rendered in the way that the consumer determines services in other fields. For example, although consumers might demand more cancer screening programs, or increased availability of preventive health services in general the professional decision about the specifics of such services are still the responsibility of physicians. This ranges from the determination of appropriate assessment procedures, the kind of medical history, the kind of physical examination determined for the ordering of laboratory workups. We don't determine, as consumers, whether we get an x-ray from this angle or that angle,

what kind of nuclear medical scans are to be taken, what kind of laboratory test will be performed. Again, these are determined by someone other than ourselves.

To the application of appropriate treatment modalities, the prescription of drugs, the recommendation for surgery, etc. again is really out of our hands although there has been increasing pressure by consumers, especially in this day and age of malpractice. More importantly, these decisions on the part of physicians determine a need for the utilization patterns of nursing in Allied Health personnel. So that in terms of our educational programs, it is not so much what we do and say as the needs of the system in general and control by physicians is certainly one of the aspects that should be considered.

The third aspect of our health care delivery system that we should look at in terms of productivity is the fact that our system is still basically a dual system of health care. It is the assumption of many that quality health is not a privilege for those who can afford such care, but a right for all citizens. However, there is significant doubt that the health care system is capable of absorbing the demands generated by this assumption or that society is willing to pay the increased costs. In fact, the health care delivery system which exists in this country today is a dual system, providing different quality and kinds of health services for those who can afford to pay as contrasted with those who cannot afford to pay. Thus, we direct our efforts to two distinct populations with a significant amount of effort related to increased productivity, directed at socially economically deprived populations.

A recent example has been the advent of the physicians assistant and the advocacy of physician's assistant services for the purpose of meeting some of the needs of medically undeserved populations. The increased availability of services in this situation is neither consumer generated nor directly related to increased quality of health services rendered. Although it is true that the physician's assistant has met increased quality of services in settings that had

previously completely lacked health care. But when you listen to the rhetoric about physician's assistants, that they are supposed to be serving health care needs in medically undeserved areas such as the inner-city where you have one to 15,000 and one to 20,000 ratios of physicians to population or to meet health care needs in the rural areas, there is no wonder that there is an attitude among those consumers, those patients, who are having these efforts directed at them that they are the victims of a "let them eat cake" attitude. It is a little bit inappropriate to say, well for you because you haven't had physicians services in the past, we are going to give you the second best thing or to give you physician's assistant services, rather than trying to distribute these services. We have a physician's assistant program, and I firmly believe in the ethicacy in this kind of service.

The fact is that health care is inequitably distributed in this country and so we have some areas where there is little or no service available and other areas where there is abundant service available, and yet again unlike other industrial models every area of this country needs health care service. And because of our dualistic system we tend to have one level of care of one kind of population, another level of care for others.

Now, a forth aspect of the health care delivery system, besides distribution, is simply a concept of the magnitude of the health care delivery system. Let me give you a few statistics. The system is now the nations number 1 industry. Last year, health care represented over 8.5% of our gross national product. Over $100 billion is spent annually in this nation on health care. More over, the rate of growth of our system has been tremendous. Ten years ago we only spent $38.5 billion and now we're up to $100 billion and over.

There is obviously a limit on what we will be able to spend on health care under our present system, but it is necessary to recognize that many factors which affect the price of health care are interrelated in such a way that self-reinforcing

upward cost spirals exist. Technological advances, consumer demand, development of a sophisticated manpower supply and other factors interrelate to drive health care costs upward, and with so much of the reimbursement mechanism based upon what the system can bear, rather than the workings in an effective market, the mechanisms merely serve to drive costs still further upward.

The key question today, however, is how do we assess all of this growth in terms of the health care delivery system in a meaningful way in terms of productivity? To be quite frank, I am not sure that it is necessary to measure increased productivity in health care. In many ways some of the goals and objectives of our system contradict the philosophy of growth in increased productivity. For example, if our efforts in preventive medicine were to reach their fullest potential, need for many of the catagorical health services currently available should decrease. If we really effectively change consumer attitude, if people really begin to take advantage of preventive medical programs, and a healthier population is the result, then logically there might be less of a need for certain medicine scans for certain laboratory tests. And for that matter, for certain Allied Health Personnel.

Now, I have brought these issues to your attention because I think it is important for educators to become more familiar with such issues to facilitate the educational planning process and to produce more effective educational programs. I would like to just end my remarks by getting into a second area, and that is, I would like to talk a little bit about the way I see educational programs in light of these general considerations about the health care delivery system.

One of the major themes that I am going to conclude with is that I think educators must work hand in hand with health providers and health professionals if programs are going to be truly meaningful, and if we are going to be responsive enough to the changes that are occurring in the health care delivery system. One

of the worst things that I have seen happen is an independent attitude among educators in some settings and thankfully it is no longer as prevalent as it was several years ago. This attitude was that when the programs left the hospital and came into the college setting, it is now our program and we are going to make them better because we are going to apply educational methodologies, because we are going to write instructional objectives because we are going to eliminate the exploitation of Allied Health workers who were previously being trained rather than educated. Well, that attitude for a couple of years improved certain of the programs, but it got carried so far that now in this day and age of increasing regulations of hospital costs, we are being asked very hard questions. At our college for example, four years ago we spent zero to pay for clinical affiliation agreements. Now we are close to $100,000 and I don't see any end to it because in Maryland, as in other states, soon in the future, there is a health science cost review commission which says to the hospital I don't want any of the patient's expenses being determined by the cost of educational programs. It has even gone so far that the hospital cost review commission in Maryland is labeling residency programs as inappropriate expenses and that these are educational programs that the cost of paying the residence not be charged to the patient. And that is a pretty serious situation, but these are the things that we need to be in tune to.

Now, let me be more specific, for the educator, a primary measure of productivity of course, is numbers of students and numbers of graduates. Unfortunately, we as educators focus on these numbers as objectives, and too often do not consider all of the factors that should determine program size. In Allied Health Program development I use four primary criteria for determining program need and size, and to be quite frank, these criteria can apply to almost any technology program, not just health, they are a little bit specific for health, but not really. The availability of classroom and laboratory space and the cost, too, are very specific, the availability of appropriate prepared core faculty and

the cost, and these last two are very specific, the availability of appropriate clinical training sites and the adequacy of supervision at these sites. It is not just enough to have a hospital agree to take your students, but unless there is some kind of control over the education at that clinical setting there is going to be problems. And then the demands on the parts of employers for the graduates. Unfortunately, the demands on theparts of the employers can change in terms of the professional societies, the dentists, the podiatrists, the physicians, long before the educational institution hears about them, and we have been burned once or twice in the past, and I am sure many of you in this room have had this experience where the dental association is changing legislation of the utilization of dental assistants where the med-physicians are either supporting some kind of movement in the medical assistant or the physicians area, where the podiatrists are, or the veterinarians are changing regulations for the use of assistants. Now, when they are promoting your graduates we cheer, but when these regulations, as often happens, undermine the ethicacy of a two-year program because they produce, for example, requirements for credentials which are considerably less. As an example, in Maryland at the present time, the dentists are pushing hard to have a concept of dental assisting known as qualified dental assistants accepted. If this happens, these non-credit moduals will qualify the dentists assistants who have been trained off-the-street, and on-the-job, these will be qualified at a level of at least 1/2 if not more, less than one year certificate requirements for the American Dental Association. In which case the programs in Maryland that have a considerable investment in terms of dollars, in terms of facilities, and terms of support of a higher level of dental assisting funcitons are going to be in real trouble because the dentists have decided that we don't need to pay all that money, we don't need that level of operation.

In addition to these primary criteria, however, I try to assess program needs in terms of the larger issues that I was mentioning to you earlier. For example, the current revision of comprehensive health planning structure at the state level. Some of you are familiar with the new health service agencies that are being created throughout the nation. It's a political football. Various states and various agencies in the state are fighting for control of the reorganized health planning system. Previously there were regional medical programs, and the Hitl-Burden funding, and the other agencies the comprehensive health planning, A and B agencies, they are all being reorganized now into a new system and who ever gets control of that is certainly going to control some of the things that we have to do as educators. In any event the current revision of of comprehensive health planning structures at the state level will ultimately result in shifting priorities in the health care delivery system. These shifting priorities could very well mean the elimination of need for certain catagories of allied health workers and the development of increased need for others. Similarily, technological developments often result in the need for new kinds of health manpower to provide health services based upon this advanced technology. Therefore, the allied health educator must keep his finger on the pulse of a multitude of perimeters in order to adapt the programs to changing needs.

Based on these considerations, and in conclusion, I recommend that colleges incorporate the following concepts into their health science education programs. In order to maximize the impact of graduates on the quality of health care and if the quality of health care improves, and to be quite frank, that is what we ought to be concerned with in terms of productivity. And I'll conclude with a few examples of that.

The concepts that I think ought to be incorporated are as follows:

1. Faculty - Wherever possible, faculty should be a combination of regular paid college faculty and faculty that are health professionals and

and employees of cooperating clinical facilities. Clinical faculty should be given appointments at the college and they or their agency should be reimbursed for their services through some kind of contractional agreement. Standard faculty to student ratios cannot apply in allied health education especially in the clinical practice and phases of the programs.

2. Students - Programs should be selected and should involve clinical faculty in the selection process. Program size should be based on the criteria mentioned earlier and colleges which feel that small programs are difficult to justify or are unfair to potential student seeking admission should seriously question whether they should be involved in allied health education.

3. Kinds of programs - Colleges should avoid a job factoring approach to meet needs for new kinds of allied health manpower. Wherever possible attempts should be made to add to the skills of existing health practioners through various forms of continuing education.

4. A much greater emphasis is required on the development of meaningful professional continuing education programs especially in the parts of community colleges which are ideally equipped to provide such education.

As an aside, I'll be glad to answer questions about this later, we've just received a major grant from the WK kellogg foundation to set up a community center for continuing education. In fact this center will incorporate programs for physicians and dentists using the community college as a delvery site not thinking of this as a 2 year associate degree level form of continuing education, but instead looking at the community college and it's resources as an ideal sight for continuing education of health practitioners of all levels. These programs should be developed in conjunction with health providers and in fact it is our opinion that the college should not be considered the prime developer of such programs. In many instances the colleges roll will merely be that of facilitator and provide logistical support.

5. And finally, consumer education - Consumer education and patient education programs should be developed with particular emphasis on providing the public with knowledge and ability to use the health care delivery system. For example, a consumers ability to distinguish between a broken and sprained ankle could cut down considerable on inappropriate emergency room visits and related charges. I could give you 1,000 examples of that sort.

The effects of the incorporation of these concepts might not increase productivity by certain measures, but will certainly result in significant changes in such measures as numbers of graduates, cost per student, and the final two, the effectiveness of existing health practitioners and consumer attitude. In my opinion, these last 2 measures are probably more significat to the concept of productivity in the health sciences than any other.

For, if the primary objective of our health care delivery system is to bring better quality health care to more people, then this is the primary factor of the measure in terms of the productivity of the system. However, in measuring practitioner effect in this and consumer attitude it is necessary to avoid over simplification that can result from the use of traditional measures of productivity. The number of laboratory tests, however, does not necessarily reflect the health of the population. The number of visits to a community mental health center does not reflect the effectiveness in dealing with mental health problems. The number of graduates in the allied health program does not always relate to the need for such personnel. When all is said and done, although all of these factors should be considered, productivity in the health sciences is not an easy concept to deal with.

PRODUCTIVITY IN THE HEALTH SCIENCES

A. Donald Insley, Chairman, Department of Nursing
State University of New York at Alfred
Alfred, N.Y.

I try to attend conferences as you do and try to pick up an idea here and there. One that perhaps is not new, but I'm glad to see it being looked upon, is the area of sharing the cost for faculty with clinical agencies. I think that is a great idea. As you listen you will find I am a very pragmatic person, perhaps this is why Bob Love, who is my Division Chairman, selected me as Department Chairman. He has all the good ideas, and I try to put them forth.

When one concerns himself with the term productivity, the logical thought is how much, how fast, effort, efficiency and effectiveness. And in the term generativity, my first thoughts were to view the health-manpower statistics to provide information regarding the right number, the right kind and the right place. Initial investigation into this manpower study resulted by 1990, we are going to have ample supply of health professionals, that's numbers. Realizing that this prediction is difficult to assertain, I still believe that the study, if we continue as we are right now, with admission, federal funding, etc., we will, in fact, have enough numbers to provide the health-manpower requirements as we now know them. So using this as a given, I began to think of producivity for who. Who is it that we are producing for? The individual, the man on the street, let's look at what is happening to him in society today.

The basic premise of health as a right of all individuals continues to be in vogue, but the individual who is receiving the benefits is changing. He is no longer a patient, a sick person, ill perhaps, and receiving care, but rather a health consumer, a client. Very much wishing to be involved in the care available to him, its implication and how effective this care was in meeting his needs. This client is a better informed individual who is out shopping for the right kind of health care. You can see that I am still a bit in euphoria, I still

believe in these concepts very sincerely, and I think you need to in order to effect change.

I think that if one accepts what now exists, the physician dominates, etc. and that will continue to exist, but I think there are ways to fight this physician of dominance, and I think one way is legislation. The Nurse Practice Act in New York State for instance, begins to think about the nurse as an independent practitioner. Beginning to make assessments, etc. and giving out advice without fear of condemnation by the physician group. Another way is by educating the citizen, the client. Once a client begins to doubt what is happening, and I see a lot of doubting. I think we have to live in communities and to listen. There is an awful lot of doubting going on as to what is good quality practice. That doubting is going to demand a consumer going out and saying we want something else than what you are giving us.

O.K., let's look at this client. This may be an individual, it may be a group of individuals or more broadly speaking, it may be a community seeking health care. The client is better informed person thanks to consumer groups who educated and encouraged these groups to demand their rights within the health care systems. I have to think that we are that kind of group here. It is primarily through this approach that we see clients actively involved in planning local, state and federal programs to include concepts of wellness and health maintenance. Primarily, through this approach, we see the trend through more community service care in the homes, and an attempt to provide quantity and quality of care. This new client has offered us direction. In fact, he has mandated direction of health care services, and if we observe further, he will continue to provide us with direction.

Our client lives in a very complex society. He is faced with increased stress, increased chronic illness, increased divorce rate, more choice concerning planned parenthood, genetic counseling and more recently, he is involved in the man-made

body park. He continues to be faced with such needs, a great deal of assistance in coping and adapting to these stresses. These clients with their variety of problems, need help, which in turn generates service needs. And, in turn generates an educational program to provide these services. In many situations we have identified health service requirements and are providing the corresponding health-manpower personnel. But providing health-manpower is just one part. What the manpower is prepared to do upon years is a very real concern. As an educator begins to add scope and direction to the philosophies and objective of our various divisions and departments believing we function to meet the needs of our ever changing society dictates that we keep abreast with these changes and look ahead with anticipation. With this in mind, I began to see the word productivity meaning to extend oneself by being a more generative kind of individual. More broadly, speaking of the generative department or division or a college, I think this is alluding to what Lou was saying when they are having this cooperative, continuing education approach. For the most part, we are developing a very fine curriculum, and I think that to me is another given. I think as I look throughout New York State, and I have visited most of the Associate Degree Programs in nursing, some have a lateral view of laboratory technology. We have good curriculums, and I think we are producing a good graduate. If these are given, then let's move on to some other ways in which we in health care areas may contribute further in meeting client needs. This is the good material coming.

First, growing costs for personnel and the general economics of education will result in emphasis on Regionalization and consortia in health technologies. We are aware of many situations that have been alluded to all ready, wherein what is presently taught in technical education is beyond that which is actually seen in practice. This discrepancy, this leg, is not only detrimental to the client receiving care, but also does not truly enhance or compliment our students' learning. One such student learning takes place in agencies off-campus. When we are teaching

one thing and seeing another, this is not a very complimentary kind of teaching.

We as educators need to be more actively involved in service and research and extend our expertise and college resources to the various health related services. I might say research, I think the whole area of problem solving, the whole area of research methodology is very easily transmitted, transplanted into educational programs. It provides a person who looks objectively as to what they have accomplished or have not accomplished and this is a tool that the graduate should have when they leave the institution. An example where one Allied program, in fact it is our Allied Health Program at Alfred, using federal funds, we developed the position of director development of package-in-service programs related to the identified needs of these agencies. Again, you are looking at material based on studies, and research data. The consortion members representing the various health related facilities meet and develop the objectives for such program packages. The Director of Continuing Education serves to put these ideas into behavioral terms. I think you see quite readily that we are seeing a practitioner who is so busy that he doesn't really have the time to step back and look at how they might approach it differently, and I think this is where the educator comes in. I think we can provide a great deal of resources for these institutions.

The continuing education, director of continuing education, utilizes all the resources of the college and the community. We've had such programs, Care of the Burn Patient, First Aide Measures, in which we have had somewhere in the neighborhood of 300 people from a very rural area come to our campus for these programs. Those individuals who attended these programs gained continuing education credit and more importantly gained new knowledge and skills with which to help clients.

On a smaller scale, a consortia can be created where in fact the member acts as a guest consultant to a specialty unit. Example; laboratory, emergency rooms,

coronary care, medical records, etc. again bringing to this group an expert in the field who involves himself objectively to improve the functioning of that unit and eventually the care of the patient or client.

Secondly, we have an obligation to reach as many clients as possible with health care services. This may be achieved through offering hypertension clinics or planned parenthood programs. In the dormatories on our campus, we have self-breast examination programs going on. And, also, again we have a mobile health unit that is sponsored jointly by the Alfred University and the Allegheny County Public Health Nursing Department, which goes around each day to a different, small community in our rural area. As a direct extension to the community or perhaps through faculty involvement, we are also involved in planning boards, public health and comprehensive health planning groups. We may even be members of Adhoc committies for an alcohol information center.

In other words, I think again reverting back to Lou's comment of, don't remain secluded or isolated from the real world that's out there. If actually, you feel you are doing a fine job and are patting yourself on the back, perhaps you are really not meeting community needs.

Using the resources that we know exist we can assist in providing public information programs such as on death and dying. I think of the older generation in our community, and what are we doing to help them is so important. How are we helping who have older people in the homes, and how can we help them to better understand their role is an important aspect. Sicle cell anemia, which has had a great deal of impact in the last few years and multi-health screening programs. This is another way of fighting physician groups. The rotary club in our area sponsors a multiple health screening program. This was faught for a little while by the physician but was over-rode by community sponsorship.

Third, more stress must be put on accountability, both as a career type program and as a service available to allied health areas and clients in general.

Clinical experience, laboratory experience, etc. outside the hospital laboratory will be expanded. We know that the interrelationship between the student, the staff, and instructor does encourage better client care. Increased use of research, for example, activity analysis of health technology personnel, or assessment studies of patients or groups of patients further provides the student and the institution with new knowledge and skills related to providing service on behalf of the client.

The approach requires that health technology faculty have a commitment to meet potential or real needs of clients. A faculty willing to extend themselves to be a more productive person and to become a more self-actualized person is very much in need.

Productivity has many meanings and it has been a pleasure to share this production with you.

"PRODUCTIVITY IN TECHNOLOGY & LEARNING"

"Training That Students Go Through In Their Field"
Speaker
Frank Sacco

We have a few of the advanced people with the larger backgrounds that can come into the navel guided missile school in Damneck, Virginia and be in, what we call, an accelerated program. So, although they have a higher background, it's not necessary, but if they do, they can complete our training a lot quicker.

At the navel guided missile school in Damneck, Virginia we are required to bring technicians out into the field, into our fleet command in ballistic missile submarines. We have two basic fields. We have the polaris missile system, which is operating in both the Atlantic and Pacific, and we also have our poseidic missile system which now is operating in the Atlantic fleet. The missiles themselves and all the associated equipment is manned by our enlisted technicians, in terms of maintenance and calibration.

At the navel guided missile school in Damneck, we teach on a platform in some situations. We also have a huge complex of closed circuit television that we do utilize. We spend about 50% of our time on a platform and we also spend about 50% of the time in our lab. When the students come into us, depending on their background, they may go into an accelerated program where they completely work on their own. Or they can come in and go through the new classrooom type schedule, and we do have the ability for the accelerated student. If he comes into an area he's not familiar with, he can pull himself

out on his own from the accelerated program and simply go into the classroom type atmosphere, and if he feels he's got that point then he can zip right back into our accelerated program again.

The labs are set up pretty much to instruct the student in the basics of electronic and electricity. We teach the basic operation of all standard test equipment. As far as the multimeters and our oscilloscopes are concerned, it takes the information that he must learn on the platform and lets him utilize his knowledge with the equipment and get the feel for the circuits.

We also teach the basics in our advanced program of the inertial guidance system. Because of the rates we have and the technicians we have, they have to have an understanding of inertial guidance in every phase. So we do use our gyro-principles and physics principles in the currculum.

After they complete the basic electronics-inertial guidance portion of the school they come into our digital portion. Jack Smith is formulating and writing the new curruculum we have for our digital portion and I would like to introduce him now to give you some idea of the training going on in our digital portion.

"PRODUCTIVITY IN TECHNOLOGY & IN LEARNING"

Speaker
Jack Smith

This is one of the areas in the digital fundamental portion of the polaris electronics school that he mentioned. The digital portion is a four week portion in which we take the students by means of an independent study, and self-paced curriculum. We take them through the complete logic elements that are utilized by computer when it is sent to the circuit, that are involved in the computer. We teach them programing and trouble-shooting of the computer.

In the first portion which is involved in logic elements, this is one of the training aides we use. The information is presented to them in their lessons. This provides a means of proof for the information they have learned. They actually see the circuits logic elements operating, and they prove the functions of the logic elements with the training aid such as this. We also have a super eight type media that we utilize along the same lines. They watch the films and supplement the information and lessons that they have.

This is a computer, a Digiac Bi-Tran Six, that we are presently utilizing at Damneck. We use this as the training computer for programing and trouble shooting, and again they reinforce their knowledge of the logic element and the computer circuit.

This is the Digiac Com-Tran 10 that we use. We are presently developing the curriculum. It will replace the computer shown in the preceding slide and I'll go into a little bit more detail as to exactly what we do with it. I have a program fed into that machine that a student that we have could write a program

of this nature for it. Computer Played Music ...is not primarily a music course, that is just one of the things it could do. We do concentrate more on programs that stay more along the lines of equations and so forth. In a programing area, we teach them to write programs for the computer, utilizing the five step method that we have been using. They have a dual role to play as they get out into the fleet and more advanced training. They do not just write the programs and leave it at that. They are required to understand more about the computer than just programing it, and sitting up there and running and listening to music, or producing a solution.

They go into the computer circuit, the central processing unit to learn the specifices as to how these various instructions are retrieved from the computer memory and executed down to the various steps of the particular instruction. They get a very thorough understanding of a basic computer and of all the basic computer units which they can apply to trouble shooting and in any other further training.

After the student leaves the basic electronic computer portion of the school, he is sent out to what we call a Sea School and he goes into more advanced training. This panel right here is our main fire control panel on board the submarine. It consists of two basic parts. The one on the left is strictly a testing panel where we can test both our missile system and our fire control system. On the right hand side we have our actual firing panel. This piece of equipment a technician from the basic electronic school learns to operate and maintain.

Also in the system we have our, what we call, digital geo-ballistics computer, which is in all of our general purpose computers, using the same principles that the Com-Tran and Bi-Tran Six that they were taught in their earlier school. They come in and learn the complete operation and programing of our actual computer for the firing of our fire and subsiding missiles.

They also come into our switching system where they are going to learn the operation and maintenance of the different interfacing and switching systems between our computers and their peripheral equipment.

We also have, because of the measurement of the accuracy required by the missile system, an optical alignment unit which is taught to the technician where we use a beam of light that gives us the exact position of our weapons inside their launching tubes which we then convert the light beam into an electronic signal and feed it to our computer.

In the navigation aspect we take the technician to the navigational field where he is required basically to supply us with navigational data to the missile system. So there are quite a few computers involved in the navigational area. As far as the systems goes in the navigation field, the technician is going to come in and operate these computers and he'll have to maintain and trouble shoot the computers. This happens to be the navigation control center which is our main interfacing panel. It gives the technicians an opportunity to talk to all of his equipment. All our navigational equipment is routed through this one panel.

We have the inertial guidance, what we call ship, the inertial navigation system, which is nothing more than our stable member that we set up. It will sense and give us velocity to the computer to let us know where we basically are. Hopefully we won't get lost by it. The technician does completely maintain the ships' inertial navigation system along with all it's peripheral equipment.

And we, at this school, also have mock up equipment. The student can go in and see exactly how things are working and he does go in and replace the different components on the navigational system.

As far as trouble shooting in the computer field, we have our Mardan computer. Technicians are given problems inside the computer and he must understand the complete operation of the computer so that he can fix any problems with

the particular computer.

We have the type 11 periscope that we use on board a submarine. We also have a mock inner school that we use to navigate. It's strictly going to shoot stars for us and gives us navigation in that line.

We also have satelite tracking equipment that we use which I don't show. The technician does learn to operate, maintain, and calibrate all our navigational equipment.

In the missile line, we also need our technicians to be familiar with the missile itself. The missile technicians come down and learn the complete build up of the missile, the particulars about the missile, and he does find out or learn how to change all the systems and electrically work on the missile itself.

We have these breakdowns in our school with the missile segnated, as we call it, into the different sections, to give the technician the opportunity to get in and see more of the missile than what he could possibly view on board a submarine. Also in the line of the missile we must have a system to test our missiles. This system, which we call our missile test and readiness equipment is going to tell us exactly how the missile is going to operate in flight. We do program it or run it in a couple of different ways. We have an automatic operation which we use hole punched perforated tape. We also have a manual system that we use for trouble shooting the missile or the machine itself. This system is tied in with the missile and it actually makes the missile think its flying electronically where we can actually find out how the missile will operate in flight. The technician, as far as the machine goes, will earn how to operate it, maintain it, trouble shoot it, calibrate it, and everything else there is to do.

We also have another piece of missile test and readiness equipment that we use for the actual launch of the missile. We are going to use this particular

machine to set up the main circuit inside the missile and check the crucial points to make sure that at the instant of lauch that all systems are go. The technician, again, with this equipment is going to be operating, maintaining, and calibrating the machine.

Besides the electronic aspect of our technicians, we also are required to use the technicians in our weapon handling area. So we also must train them in the basic physics and mechnaics portion.

Also in the line of high pressure air and hydraulics, the technicians on board a submarine are required to maintain their own hydraulic systems and thier own air systems. We have a 4,500 pound air system that we use in our launching system. This particular scene is taken off an actual launching tube at the school and it's used to pressurize the tube when we are under water in order to get the pressure in the tube equal to the pressure outside. The technicians are going to come in and rip these thousands of different valves apart completely maintain and operate the hydraulics and air systems.

After a technician receives all the training in this particular field, he goes to the fleet and to sea. After he comes back from sea he goes into a training cycle where we are actually going to test out and see how our teams are working in the fleet. So we are going to put in known casualties in the systems with the teams we have working in the fleet. These known casualties to the instructor are placed in and then we run actual submarines type affairs where the students are going to have to react as they would on a submarine. This is done in the navigation portion. It's also done in our fire control portion. In this scene here, we are going through an actual countdown and the students are trouble shooting their equipment to find problems, because we do have a time requirement that we must meet so when we run accross the problem we have to go out and fix the equipment and continue with the launch. We also do this in our launching and missile system. We put problems in missiles, we

put problems in the launching system. We have many many electric magnetic relays, which the technician is required to understand, operate, maintain and calibrate. Also in our fire control, the actual firing of the missile, we insert casualties in all the computers.

We do have a movie for you on our submarine fleet, submarine force, which I hope you enjoy and also if there's any technical educators here, if they would like to come down to our school and tour our school, please come up and give us your names. I'll give you some addresses on people to contact if you can come down and see the training in progress at our school.

"JOINT APPRENTICESHIP - ASSOCIATE DEGREE PROGRAM"

Frederick A. Byrne
United States Department of Labor
Employment and Training Administration
Bureau of Apprenticeship and Training
Rochester, New York

I was surprised to learn that we have a number of community colleges and technical colleges participating in apprenticeship training programs in the State of New York, with over 1,000 people registered in these programs.

We have here, in Rochester, Monroe Community College, where we have the electricians, probably the biggest building construction trade, with the largest participants in apprenticeship training programs. I have sat with the Monroe Community College people and discussed the possiblity of apprenticeship training in associate degree. I think one of the things that bothers me most is that we didn't go far enough on most of our large apprenticeship programs in this area. The reason is we've had a very poor raport with the local Board of Education. I'm sorry if I've stepped on somebody's toes, but this is the truth.

A few years back, we used Edison Technical and Industrial High School exclusively for apprenticeship training. In the mid 60's it seemed to drop off considerably, and many of our large joint apprenticeship committees and independent sponsors went to outside training. National Tool and Dye, formed their own apprenticeship training school. The electricians, of course, went to MCC and the plumbers and steam fitters built their own training center here in Rochester. I think that community colleges and technical colleges certainly have a place and should look into the apprenticeship training and related instruction. But I think they're a little late, at the present time, looking at the economic conditions of the country and especially of New York State. We also have to take

into consideration the cost, and knowing what it costs to train a single apprentice for about a period of 6 months, about $1,200 and the necessary upkeep and maintenance of a school, and teachers. I do and I have been associated with the plumbers and steam fitters of Rochester for 37 years. For 26 years I have been directly connected with administrating programs. I know something about coordination. I know something about building a building and I know something about the cost. And I think we have to look at the community colleges and the technical schools to further the education of the apprentice and just how far are these organizations going to go. Are they going to provide the instructors? Are they going to accredit the course outlines that we have now? Or the curriculums involved in the various courses? Or are they going to accredit a journeyman teacher and the courses we have and provide the necessary credits towards associate degrees? Then too, in a four year program, we have 576 hours of related instruction mandated by the state of New York. The state says we must have quality programs. These good, quality programs are necessary and I think sometimes we get bogged down in too much paper work, too many reports, too many requests and a field man, such as myself, almost becomes office bound to do the necessary reports and paperwork we have to do.

If we're going to get into community colleges, the people, the sponsors, the contractors, the joint apprentice training committees are going to have to sit down at MCC, RIT, Erie County Tech and the rest of the colleges in this area and discuss just how far and what they are willing to accept. Are community colleges going to accept these courses? Are they going to give credit for these courses? Are they going to accept their journeyman instructors, who have been teaching for years and many of them are accredited by the State Department of Education? And if this is done, then how many more hours, semester hours, or clock hours, is the apprentice going to have to put in to receive his associate degree?

These are some of the things that we have explored in the past at MCC and we really never have come up with any concrete solutions. I know in Long Island they are doing it, and in a few other places throughout the state. So somebody must have an answer and I wish they'd give me the answer here in Rochester, because I think that some of the related instruction is very poor. The places they go to school are not accredited, and we have a hard time with the local DLEA to get programs accredited. I think the place that we could get them accredited and the place we could develop good related instruction is with our community college or technical schools.

I think the worst situation we have in apprenticeship training is the lack of mathematics, and the lack of people being able to read and comprehend what they read. And as far as testing goes, I think that one of the things, one of the most important things that we have in apprenticeship training programs, is to be able to test people and find out what they're accomplishing. A test doesn't only tell us what the apprentice is doing but it also tells us what the instructor is doing. An article in the local Times Union says that everybody must pass math and be able to read so they could read a newspaper and also be able to figure out their income tax. If these schools do not give this type of thing then they are going to publicize these institutions in the paper. Now if a kid can't read, I take maybe that the parents can't read. I don't know where they are going from there and I think this is one of the things we are going to have to look very hard at. What is going to be given and how is it going to be given and who is going to do the teaching, and who is going to accredit these courses?

If community colleges and small technical colleges wish to go into apprenticeship training they are going to have to sit down especially in this area, right in the Monroe County area, and discuss in depth what the large companies are

doing.

As far as large companies are concerned, the people in industry and manufacturing, Eastman Kodak probably has one of the largest training programs, unregistered apprentice programs in the state. I know that in their machining trade, building construction trade, they have 13-14 programs, 586 unregistered apprentice programs. The related instructions run somewhere in the neighborhood of 400 and 700 hours a year. Now these people are in only one or two programs that Eastman Kodak has that are not within their own confines, they are outside. I think, RIT. I think these are in the drafting and engineering designs.

So all I'm saying and all I have to say is that the committees are going to have to sit down if community colleges want to get in depth in apprenticeship training and decide where they are going to go, and how they are going to do it, and who's going to operate the programs, who's going to accredit them, who's going to certify the teachers, how much credit is going to be given for each program. Especially the old time programs that their international unions and their training committees have developed over the years, and how much more time is necessary for the apprentice to receive an associate degree.

Gentlemen I won't bore you anymore, thank you.

"JOINT APPRENTICESHIP - ASSOCIATE DEGREE PROGRAMS"

Michael Collins, Director
Operating Engineers
Dual Enrollment Program
Washington, D.C.

I would like to recount to you the experience of the National Union of Operating Engineers in promoting the concept of Dual Enrollment, which is our term for programs combining apprenticeship and college study.

The program was begun in late 1972 under the sponsorship of the National Joint Apprenticeship and Training Committee for Operating Engineers, a joint labor management body and represents the coalescing of several needs and pressures that were felt within the organization. First, I would like to ask is there anyone here who does not know what an operating engineer is. There usually are a lot in my program. No, everyone knows, well fine.

The operating engineer's Dual Enrollment program is based on 3 major premises. By 1972 it had been clear for a number of years that the trade of operating engineer was growing constantly more technically sophisticated. The ever increasing complexity and technological evolution of construction processes and heavy equipment along with the staggering cost of mistakes have necessitated greater technical knowledge and advancement training on the part of operating engineers. In 1972, many IUOE apprentices were already receiving instruction at colleges as part of their apprenticeship programs. Some times taking courses designed specifically for them. Sometines taking courses that were a part of the school's regular offerings. They were not receiving credit for the courses, however, nor was there a curriculum into which the courses would fit even if they had received credit. Our first premise then is that the technical knowledge and educational

descipline required or an indentured apprentice in the operating engineer trade is similar to the knowledge required of an undergraduate student.

Management representatives from the construction industry expressed another need through the joint apprenticeship committee. There is a shortage of well-qualified management personnel at the level of project management.

If there are any carpenters in here today, I apologize for that statement, but there is.

Traditionally, companies used one of two approaches towards fielding these positions. First, they would hire an engineer with a degree, usually a civil engineer, and teach him management techniques and the realities of the construction business as a day to day operation. This person tends to lack the knowledge of what really happens on the job sight and is weak in skills of management and personnel relations.

The second type of project manager was promoted from the ranks of craftsman. This individual knows the job well, but is hampered by a lack of formal technical and managerial training. For both types of person, training is a lengthly process to reach the level of project manager. If a career path could be created that would help a young person integrate the practices of construction with theory and management, such a person would be highly attractive to the large construction companies. At the same time, apprenticeship programs and unions have recognized that their organizations need individuals with more sophisticated training and the ability to easily assimilate new developments.

Apprenticeship programs will need better qualified instructors, coordinators unions, and more highly trained representatives. Thus, the second premise of the Dual Enrollment program is that dual enrollment can result in expanded and improved career paths either within the trade, in the union, or in management.

Most important though, all the concerned parties felt that a program combining apprenticeship and college would provide greater opportunities for

personal fulfillment and career advancement to the individual apprentice. The responsibility of the union, after all, is to the well being of each of its members both on and off the job.

Our third premise, thus, is that by improving the opportunities of the highly motivated apprentice and opening new routes to positions of responsibility in the industry every segment of the construction community will benefit.

With those goals in mind, we began the Dual Enrollment program. A small grant from the office of research and development in the manpower administration defrayed the expenses of the project director, myself, and the advisement committee, which was made up of representatives of higher education, management, and labor and incidentally, chaired by Dr. M.P. Catherwood who was formerly Dean of the New York State School of Industrial Labor Relations and Industrial Commissioner, I think, of Highways here in New York a few years back under former Governor Rockefeller.

The programs objectives were modest. We hoped to prove the feasibility of combining regular apprenticeship, on the job training and related instruction with college instruction and a curriculum leading to an associate degree. We hope to find 9 colleges willing to start such a program in 3 years and to duly enroll 300 apprentices during those 3 years.

Well what has happened in the 3 years since the Dual Enrollment program got underway? Not 300 by nearly 3,000 IOUE apprentices are participating in dual enrollment programs in more than 20 states today. Two successful curriculum models have been developed. Most important, perhaps, a giant step had been taken in overcoming traditional barriers between college and education gain in job training, upholding the principles that knowledge is knowledge whatever the source.

Now, how does the typical dual enrollment program work? First of all, I remind you that our apprenticeship in the operating engineers in operated on

the local level, although locals are sometimes as large as whole states. Local joint apprenticeship committees operate the programs independently of the national office although there are national standards. The international union office only provides support curriculum materials on national conferences and supporting material for the local programs. They are autonomous and they differ somewhat in structure from place to place.

Well, turning apprenticeship into college credit. That process is what lies at the heart of the dual enrollment program. It is the point at which the two institutions, the college and the apprenticeship program, must agree in concrete terms on the extent and mechanics of their interrelationship. Both parties must be honest about what they have to offer in the interest of the individual student. Although all IOUE apprenticeship programs have similar structure, no two are identical, and as colleges differ in their accreditation policies, each assessment must take place on a case-by-case basis. More formal approaches to assessment such as that followed by the commission on educational credit at the American Council on Education, which some of you may have heard about, have been considered by us, but have not been employed.

Typically, college officials, local apprenticeship program officals, and the dual enrollment program representatives, that is myself, meet to revise the apprenticeship curriculum. Now the reason I am involved in this is that I act as the translator really between the two institutions and its' important to stress that you have to get people in the same room and get them to speak the same language. More harm is done through misunderstanding than through any real point of conflict in interest or points of view.

The college personnel are encouraged to view the apprenticeship curriculum as a whole course of study not as bits and pieces that would be equivalent to some particular existing course. Not as a direction on mechanical engineering of a branch of several engineering ways, but as a career field in itself with

rich possibilities for further exploration.

The acceptance of the integrity of the career field and its curriculum is crutial to the success of the dual enrollment program.

Well, given that a determination is made that apprenticeship curriculum materials are comparable to college course material, check this through a review of all apprenticeship curriculum materials, and in almost all cases, credit has been granted on an hour-for-hour basis. That is apprenticeship class instructional hours are converted to college credits following the same formula used by institutions for college classroom instructional hours.

For example, 15 class hours is a credit hour in most community colleges depending on whether they have the semester system or the quarterly system. Assessing work experience as college credit is another important element of the dual enrollment program, and that is also done on a case-by-case basis. Although many institutions already have policies for granting credit for work experience it is often the case that old policies don't exactly fit new situations and this is a new situation. Verification of work experience is not a problem in the dual enrollment program thanks to the elaborate record keeping and close supervision required in the apprenticeship programs. This is another very important point I think, The supervision of work experience. Supervised work experience is very important in all the colleges we have talked to as a step in accrediting work experience. We think it is very important from our point of view too because only in that way do you really know what is going on and on-the-job. Whether this person is having the kinds of varied experiences that should count in educational terms. An operating engineer or apprenticeship program includes from 432 hours to more than 700 hours of classroom instruction depending on the part of the country it is in. Supplemented by field instruction and 6.000 hours of supervised on the job training, more or less, to 8,000 hours in some places. In practice, colleges have translated the operating engineer apprenticeship ex-

perience into credits equaling one half to three-fourths of the requirements of an associate degree, depending on how rigorous the apprenticeship program itself is.

I would like to say a few words about costs of the program. When discussing the costs of a dual enrollment program, it must be kept in mind there are 3 parties to each program really, the apprentice himself, the apprentice student we should call him, the apprenticehip program and the college, and the interest in each must be considered. The cost of apprenticeship instruction is born by trust funds set up for that purpose into which a fixed amount is paid for every hour worked by a member of the union. The cost of training operating engineers is considerable, as you can imagine. I think a conservative estimate would place it at about $3,000 a year, per man. We believe the colleges, on their part, should not charge for the credits that they grant for apprenticeship, related training, and work experience because those costs are born by the apprenticeship program itself. And this in fact has been the case in all of our dual enrollment programs.

It's the policy of the National Joint Apprenticeship and Training Committee for Operating Engineers that the marginal cost of college attendance, that is the other classes on top of the apprenticeship experience that must be taken to fulfill an associate degree be made as low as possible. Through recognition of prior creditable experience and agreements with low tuition colleges and here I'm talking mostly about public community colleges. And second that the marginal cost of college attendance be born in most cases by the student.

Dual enrollment program agreements have been made with institutions charging comparitively modest tuition. I'd say, in almost every case less that 15 dollars a credit, and they are almost all local community colleges, which is within the reach of the typical apprentice who attends school part time while working.

Some local apprenticeship programs offer financial assistance mostly in the form of a tuition rebate after successful completion of a course. A few local unions have separate educational funds that provide a financial assistance for any member. Most do not, though, and most apprenticeship trust funds choose to confine the purposes for which their monies can be spent to the actual training of operating engineers. This determination is made in every case at the local level. There are other forms of financial assistance, including the expansion in 1975, of the basic education opportunity grant program to include part time students. Low income students who attend college at least half time can receive substantial grants. It's also possible for your student, your apprentices who are veterans, to be able to switch from apprenticeship benefits to student benefits if they go to school enough of the time. In fact some of our apprentices who are eligible for veteran's benefits actually find that college attendance supplements their family income somewhat.

Although the recently depressed condition of the construction industry has created many hardships, and no place more than New York I might add, the costs of college attendance supplemental to apprenticeship, averaging perhaps 50 to $100 per semester for tuition and books certainly would not pose an insurmountable financial problem to the vast majority of operating engineer apprentices.

Now what have we learned in our past 3 years running the Dual Enrollment program? Well, there are several problems, concerns and points, that I'd like to discuss. I'll bring up a few of them and then I hope I can address some of your concerns in the question period later.

First, apprenticeship and union officials are concerned with keeping control over their training programs. This is their uppermost concern. They know best what's needed to produce competent journeymen, and colleges must accept that. The college will have no say over the content of apprenticeship. They can evaluate it for credit but not change it. I think that is a fair assessment of

how our people will feel about this situation. You just have to deal with that.

Second, college staff must remember the political realities of unions. This is largely a matter of presentation. If they present a dual enrollment program as a training ground for future union officers, the program doesn't have a very good chance of being adopted. No one wants to train his opposition.

Third, we've found that our students are serious students and they don't want to get through as easily as possible. They want courses relevent to their interests, and this can be a problem in many community colleges, because there is a lack of courses generally, nationwide. We have surveyed this, dealing with construction management and labor relations courses from the points of view that our students are interested in. We have found, too, that the union orientation of students adds a considerable amount to their classroom experience both of themselves and of other students in the courses. They've been a significant addition to colleges where we have had a great number of students.

There are several other points that we could discuss here, including, I didn't mention one, our second successful curriculum model which is a full time one-fourth per year full time, program which we operate at Dickinson State College in North Dakota. If people are interested in that I can bring it up later. There are other issues such as open enrollment which we might want to talk about but really I'd rather discuss the things that you are interested in.

Finally, the most important thing that we have learned from the dual enrollment program is that our members are hungry for education and they mean to get it whether we help them or not. The demand is there. If we do help them, they can obtain relevent education with far less trouble than they might otherwise encounter. And with out loosing credit for all of the educational experience they gained outside of academic institutions. Our efforts are now being directed toward articulating dual enrollment program curricula with 4-year degrees. For we are again being surprized by the number who intend to continue after earning

an associate degree.

It's time that apprenticeship and colleges got closer together. These institutions can stregthen each other. College can broaden and deepen the experience of the apprentice. Apprenticeship as an operating engineer is the basis for a cooperative education program beyond the means of any college. And a program which offers access to college without regard to previous economic status.

"JOINT APPRENTICESHIP - ASSOCIATE DEGREE PROGRAMS"

David Danzig
New York State Department of
Manpower Development

The essence of education is to permit an individual to become all that he or she may become, limited only to talents and ambition.

In March 1972, representatives of labor, management, government and education including presidents of twelve state-operated colleges, met with State Industrial Commissioner, Louis L. Levine, and the State Apprenticeship and Training Council, to explore the feasibility of establishing a college associate degree program in cooperation with the apprentice training program that is supervised by the State Department of Labor. Commissioner Levine pointed out, "The college associate degree program will offer advanced education to those actively engaged in the world of work." At that time, this was a visionary phrase.

This dual enrollment program was to give an apprentice the opportunity to complete his training and receive his journeyman's credentials and an Associate in Applied Science degree from an accredited two-year college. At the time, there were over 24,000 apprentices registered by the Department of Labor in New York State. They are required by law to take 144 hours per year of classroom instruction directly related to their trade. By combining these requirements with the course curriculum and the special training resources of two-year educational institutions, the apprentice would be able to reach his matriculated objective.

The college's role in this unique program was:

a. to maintain the candidate's collegiate records.

b. to examine and approve all texts, course content and testing procedures

c. to counsel and guide students in the selection of electives and supplementary studies leading to the student's educational objective.

The college would also grant the Associate in Science degree to those students who successfully complete the requirements as set forth by the union and the college. The union's supervisory responsibility was to include:

a. the keeping of student records in the apprentice program.

b. maintaining the curriculum of apprentice training program on file with the State of New York Department of Labor.

c. to transmit to the college records of successful completion of courses by students working for an Associate in Applied Science degree.

The unions would further maintain the courses in the apprentice program to conform with the standards of the college and any changes in requirements would be derived from mutual agreement between the union and the college.

By September 20, 1972, a remarably short period of time for the registration process, the State Education Department granted approval to the State University College at Farmingdale to offer a program of study combining General Education, Work Experience, and related Technical Studies leading to the degree of Associate in Applied Science. This was the first college curriculum of its kind in New York State. It was designed in cooperation with the International Union of Operating Engineers.

Other two-year colleges offering programs in cooperation with union apprenticeships are: Erie County, Hudson Valley, Suffolk Community College, Rockland, Dutchess, Adirondack, Mohawk Valley and Monroe.

Current Report on Colleges Offering a Dual Enrollment Program

Westchester Community College now has a program with the Operating Engineers. The union pays the full tuition. The program has been in existence for four years. It starts with fundamental English courses and runs the gamut to Mechanical Technology courses on the "senior" level. They are now negotiating with the Fiat Corporation.

Suffolk Community College is running a program with the Electrical Workers Union (International Brotherhood of Electrical Workers).

Dutchess Community College has a program with the International Brotherhood of Electrical Workers.

Mohawk Community College in Utica began the negotiations for the apprentice program in 1972. The course outline was approved in the Spring of 1974.

At Adirondack Community College the apprentice program became functional in 1972 through the help of the Sandy Hill Corporation and the local BOCES. Courses were given in the apprentice program that included: electrical, machine tool operator, and blueprint reader.

Erie Community College in Buffalo, New York at the present time, has three apprentice programs in progress. They are, sheet metal, electrical, and steamfitters. Since the inception of the sheetmetal apprentice program, the college has begun a program offering a degree in this area. By June's graduation, they will have conferred three degrees in the area of sheetmetal workers.

Rockland Community College has an Electrical Technology curriculum in which the union acts only in an advisory capacity. They run this program as a regular two-year degree program.

Monroe Community College's Electrical Technology curriculum started in 1972 with an enrollment of 138 students. The union apprentices are enrolled at the college in basic Liberal Arts courses.

Hudson Valley Community College started their program in 1972. Finally, it got under way in 1974. The unions involved were the Iron Workers and Carpenters and they also have a program for machinist from the United States Arsenal. The courses that are taken at Hudson Valley by these individuals are, science, math, physics, and social science.

Commissioner Levine's vision of the future, offering advanced education to those actively engaged in the world of work, has not as yet bloomed to its fullest capacity. Many of the colleges reporting in this survey indicated that the recession, particularly

in the construction and related trades, has reduced numbers of union members participating in the dual enrollment apprentice-degree programs. Others indicated that there is not clear incentive to seeking a college degree in terms of increased pay for journeymen with a college degree.

However, these factors are beyond control of college or unions. The increased cooperation between academia and the "world of work" is an extremely valuable outcome of the efforts of campuses and unions.

ATEA LUNCHEON

J. Frederick Kenny, Manager, Marketing Development
Xerox Corporation

THE CHALLENGE OF CHANGE

I was delighted to accept the opportunity to address this meeting because we share several things. In particular, every single person in this room shares with me a participation in what I call the "information business". When I say that, I am using the same definition that the Princeton economist, Fritz Maclop, used in an article he wrote several years ago in which he said the "information business" is comprised of: the creators; the transporters; the transformers; the processors; the interpreters; and the analyzers of information. Certainly you recognize the rolls that you play within that definition. To one degree or another, as educators, you play them all.

Now, when Maclop employed that definition, he was pointing out that the "information business" is the biggest one there is. It's currently consuming a good deal more than one-third of the gross national product of the United States, and it is growing. It's bigger in terms of monitary expense than the sum total of the expenses of the Federal Government. It's bigger than the steel and automotive industries combined. In fact, it has become the cornerstone of this nation, if not the entire world's economy. Since we are engaged in the biggest business there is, together, the need to make it more productive is obviously a major point, and it is very, very clear. The problem that we face is that our productivity is really measured in the productivity of others. Consequently, I would like to congratulate you on your choice of a theme in this convention. Productivity is the burning issue in this nation, as a matter of fact, around the world both today and into the future.

Let me take a moment to underscore that. I'd like to quote a few words from an advertisement which appeared in fortune magazine as well as other business journals. It was one of the first in the series of U.S. Steel ads dealing with the need for increased productivity.

I'm sure you've seen some of them. People such as Henry Ford and David Rockefeller... . . perhaps even David Burnham, your key note speaker . . . have been quoted in the series. But this one is unique. In this one, it is not a business leader, it is I. W. Abel, President of the Steel Workers Union, who is quoted.

Mr. Abel says, "I call upon every American to enlist in the crutial battle to improve our lagging productivity. Nothing less is at stake than our jobs, the prices we pay, the very quality of our lives." He then goes on to develop that theme more completely.

It's pretty prophetic really. The date on which this ad appeared was November, 1973.

After expanding on the need for increased productivity, Mr. Abel went on to build his prescription to solve the problem. Underlined in the ad are these words . . . Again I quote, "By improving our technology, and really using the technology we already possess."

Mr. Abel, a man who many of us in business consider to be a labor statesman rather than just a labor leader, believes every word in this ad. I know; I checked.

Clearly, then, one does not have to be in business or in government to understand the importance of the target you have chosen. As educators, though, you have taken on a massive task.

In all the literature and talking about business expansion, technological breakthroughs, new products, new markets . . . one thing is

often misunderstood. We are all participants in an "information explosion."

Information is expanding many times more rapidly than our economy . . . primarily because of the explosive growth of the body of new knowledge.

To cite some examples, there are experts who have said that if a child was born today, half of the sum total of mankind's knowledge would be acquired by the time that child entered kindergarten at age five. Then go on to point out that, since knowledge feeds on itself in a sort of chain reaction, fully ninety percent of man's knowledge would be acquired before that child, born today, reached age fifty.

The problem we all face is that new knowledge, in and of itself, is a relatively useless commodity until it's processed.

His theme throughout the ad was, if we adopt a don't give a damn attitude, we risk becoming a second class economic power.

The processing of knowledge requires that it be converted to information. The information must then flow through various conduits to people who, when they've converted it back to knowledge, can put it to productive use. Then the knowledge has become a useful commodity.

Ladies and Gentlemen, you are among the most important of the conduits through which the knowledge, information, knowledge processing cycle is carried out. And the magnitude of that task is increasing exponentially!

Maurice Michell, as President of Encyclopedia Britannica, once said that if all the information generated by man from his appearance on Earth until 1960 was recorded, it would require twenty million volumes of his encyclopedia. He also projected that by 1990, it would require two hundred million volumes; and, by the year 2000, two billion.

I'm sure you recognize that information, generated by the growth of new knowledge, will manifest itself in dramatic changes in technology. I have seen some things in our own research and development that have caused me to question the messages my eyes were sending to my brain! What I just watched was virtually incomprehensible, and yet I had just seen it happen. I'm not here to talk about the fact that new technology is coming out of our laboratories and out of the laboratories of other organizations, you know it is.

I would like to share with you what I see as the result of that growth of technology. The utter scarieness of what is going to happen in our own daily lives. Those of us in business, at least those of us engaged in the innovative use of technology have just begun to discover the enormity of the problem. How well we succeed in achieving our goals is going to be dependent on how well we understand the human interface with technology. That, of course, requires that we try to understand the thought processes people go through as they go into a daily work process. In short, our problem is to try to determine how rapidly we can introduce change, dramatic change, without running into the intolerant threshhold of the people affected by that change. There has been a pretty good history of misjudgment in trying to plan along those lines. Evelyn Barrison, who's the President of the Redacton Corporation, once said that she believed that people will always take longer to change than we expect. Particularly, when we expect them to change the way they do things. Back in the 1950's, she pointed out, the data processing industry thought that the world would be completely converted to computers by 1960 and it hasn't happened yet.

As business looks at the shift in the American work force, from

the manufacturing sector more and more into the administrative and the service parts, we really may have to force the issue. There is so much to be done. Always differently than before, always more expensively than before. We may not be able to wait. We must accelerate the actions of automating the non-production, the non-manufacturing sections just as we have done historically in manufacturing. I think it is essential that we increase the investment in capital equipment for service and administrative people, from the skimpy $2,000 a year or so that we spend now in those areas. To something a little closer to the $2,500 or so a year we spend for each manufacturing employee. But most importantly, in that process we've simply got to find ways to change the mind set of the people whose productivity can be affected in that way.

Your challenge . . . perhaps a better word would be crusade . . . is preparing people to adapt to change. You've got to make your students understand that they must be flexible . . . ready to accept new ideas, new ways of doing things. You are practitioners of preventive therapy to ward off the disease Alvin Toffer terms "Future Shock". Future Shock is not going to occur some day . . . it is here, now.

Now, in addressing that challenge, you are probably going to be frustrated by tradition. I know I'm frustrated by that. Everyone I know is in favor of progress. The only thing they object to is change.

Now, in terms of education, the tradition is that one goes to college for four or more years . . . and thus becomes "educated". There's little further need to study; to read, to observe . . . at least not in a formal, structured way.

But that tradition simply won't work in a dramatically changing world. No one with ambition can afford to fail to be a student for

a life time. In this state, we happen to have some statutes that recognize that fact; for example, a physician in New York State must have 100 hours of approved continuing education each year or lose his license to practice.

There is nothing basically wrong with getting a four year college degree, provided you want it for the right reason. I saw a comment on a recent TV show which clarified that point . . . it was that a college education provided not only a means of bringing home the bacon, but, more importantly, a way of knowing who bacon was. I think the comment was a good one, but bringing home the bacon is a very important need for most people. And most people will have a better chance of bringing it home if they understand how to do a good job well when they start at it. They have a better chance of achieving self-fulfillment if they can believe that the technically oriented jobs can and should be addressed with pride.

They must be given a thirst for knowledge . . . an intellectual curiosity that drives them to seek rather than inhibit the change that results in progress.

They must understand that productivity is not a dirty word, but rather the key to this nation's future growth . . . and the jobs that the growth will generate.

And, of course, they must be provided the basic tools; knowledge and skill, with which to start.

The burden of meeting this array of challenges is on your shoulders because you are teachers. No single group of people can have more influence than you in accelerating economic and social growth.

Speaking as a businessman, and a citizen, I wish you every success. I'm confident you will tackle the enormous challenge you have defined with dedication and skill. From either point of view, we need you.

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